[illegible]

[illegible]
San Diego, California ([illegible])

Pacific Environmental Services, Inc.
[illegible], CA

Prepared for

Council on Environmental Quality
Washington, DC

Jun 78

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE | 1. REPORT NO. | 2. | 3. PB81-179619

4. Title and Subtitle
Stationary Source Performance Case Studies
San Diego, California (1975-1978)

5. Report Date
June 1979

6.

7. Author(s)
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8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Pacific Environmental Services, Inc.
2932 Ocean Park Blvd.
Santa Monica, Calif. 90405

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C) EQ7AC019
(G)

12. Sponsoring Organization Name and Address
Council on Environmental Quality, 722 Jackson Pl. NW, Washington, DC 20006, and U.S. Environmental Protection Agency, 401 M St. SW, Washington, DC 20460

13. Type of Report & Period Covered
Final Vol. II

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

CEQ and EPA sponsored five studies examining the response of sources to the regulatory approach to controlling air pollution, with emphasis on the post-compliance emissions history. The study areas are: North Carolina (3 vols), Houston (3 vols), San Diego (3 vols), Chicago (3 vols), and New Jersey (3 vols).

This report presents the findings on performance of 29 stationary sources in the San Diego Air Pollution Control District.

17. Document Analysis a. Descriptors

air pollution control
regulation
San Diego County
stationary sources
costs

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

18. Availability Statement
NTIS

19. Security Class (This Report)

20. Security Class (This Page)

21. No. of Pages
197

22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

FINAL TASK II REPORT

STATIONARY SOURCE PERFORMANCE CASE STUDIES

SAN DIEGO, CALIFORNIA (1971-1978)

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EXECUTIVE SUMMARY

Pacific Environmental Services (PES), Inc., performed a study for the Council on Environmental Quality (CEQ) and the U.S. Environmental Protection Agency (EPA) entitled, "The Effectiveness and Costs of Selected State and Local Regulations for the Reduction of Emissions to the Atmosphere from Stationary Sources." Case studies investigated by PES dealt with San Diego, California, and Chicago, Illinois, and covered the time period from 1970 to 1978.

The overall study represents an initial effort to systematically collect and analyze data associated with air pollution agency regulatory actions and the related responses by stationary sources. The first task involved an analysis of the regulatory process for agencies in each case study area. The second task deals with the responses of 20-30 stationary sources to the agency's programs. Participation by the sources in our study was voluntary and they were assured that information provided by them would remain anonymous to the CEQ and EPA. The third task will evaluate the relationship between source performance and the regulatory process.

This document is the final Task II report on the study of the "Effectiveness and Costs of Selected State and Local Regulations for the Reduction of Emissions to the Atmosphere from Stationary Sources" in San Diego County. The Task I report was an analysis of the regulatory process which focused upon the rules, regulations, procedures, practices and costs associated with the San Diego Air Pollution Control District (SDAPCD). The Task II report presents the performance of 29 stationary sources in San Diego County in response to the regulatory effort of the San Diego Air Pollution Control District (SDAPCD). The sources selected for study in the Task II report are grouped into 11 generic categories. The PES report contains five of the 20 major point source for hydrocarbons in San Diego; two out of ten for oxides of nitrogen; and 11 out of 36 for particulates. The full report of 29 sources represents 2.4 percent of the regulated sources in San Diego.

A survey of the sources in the PES Task II report reveals that standardized processes, e.g., asphalt plants which install well developed control technology, have had no difficulty in attaining compliance levels. Less standardized processes with innovative control equipment however, have experienced frequent breakdowns. Typically, other processes with violation problems are sources which either produce odors or have poor maintenance procedures.

Vapor recovery systems were installed on the petroleum bulk storage operations in an effort to reduce hydrocarbon emissions by 90 percent to comply with the SDAPCD regulations. At the time, the technology was not well developed and the control systems for two sources had design problems. In general, the emission levels fluctuated between approximately 95 percent vapor recovery and no vapor recovery. Notably, the source with the greatest problem had selected the vendor with the lowest bid.

The difficult source problem was associated with the control of odors. Several of the sources had experimented with incineration as a method of control, but had abandoned this approach because the fuel costs were too high. Presently, most sources are using odor scrubbers with moderate success, i.e., they still occasionally receive community complaints.

Two sources for particulates were occasional compliance violators because their maintenance efforts were inadequate. The amount of emissions released were slight considering the potential for the operations. Nevertheless, the two sources were slow to repair leaks and correct faulty maintenance procedures. The SDAPCD noted their violations and caused the sources to take corrective action. Presently, both sources have upgraded their maintenance programs with the result that neither source has received any recent violations.

One of the steam generating plants had an older boiler which modified its process to reduce NO_x emissions. The modifications included two stage combustion and steam injection. NO_x emissions were just above the compliance level. The SDAPCD felt that they would not be able to sustain a court action for violation because the emissions were too close to the allowable level. Subsequently, no action by either the source or the agency has been initiated.

Adequate control equipment was found to be too expensive by two sources in the study. One source was an incinerator and the ther an odor producing foundry. Both sources were marginally profitable and decided to cease operating rather than install the necessary equipment.

A mineral processing plant was discovered by PES to be normally operating in violation of their permit requirements. The source was not using a required wetting agent. They claimed it lowered the quality of their final product. In addition, the source maintained the SDAPCD inspectors could not detect the difference.

Overall, the sources studied in the Task II report had experienced some problems reducing their emissions to their respective compliance levels. The vast majority of these sources had completed their compliance schedules and were presently operating within the allowable limits. The sources with the fewest control problems were predictably the ones with rather standardized processes. Conversely, sources which installed innovative control equipment often experienced protracted compliance problems.

CONCLUSIONS

The information collected on the stationary sources has several focal points, i.e., the source descriptions are subdivided into seven sections and the sources are grouped into eleven categories. To facilitate the analysis of the full report, three topic headings have been chosen; Technical, Nontechnical, and Financial. Within each of these topics, cross categorical information is compared and analyzed. Although the conclusions address well established trends such as onerous impact of pollution control on small companies, the main emphasis is placed on less circulated knowledge. In every case the conclusions are weighted according to their impact on the environment or to their financial burden on the source. There is also the attempt to juxtapose conflicting information or practices and examine the logic or speciousness of the reasoning.

TECHNICAL

There were two important policies adopted by the San Diego County Air Pollution Control District to increase the evolution of technology for air pollution control by stationary sources. These were the policies of best available control technology (BACT) and technology forcing. Perhaps one of the best known examples of failure with the technological forcing policy is the mandated installation of vapor recovery systems on gasoline dispensing facilities for vehicles. The mandate came too soon to have a reliable system available. The BACT policy is best illuminated by the success and failure of requiring selected stationary sources to use baghouses rather than wet scrubbers or equivalent control techniques.

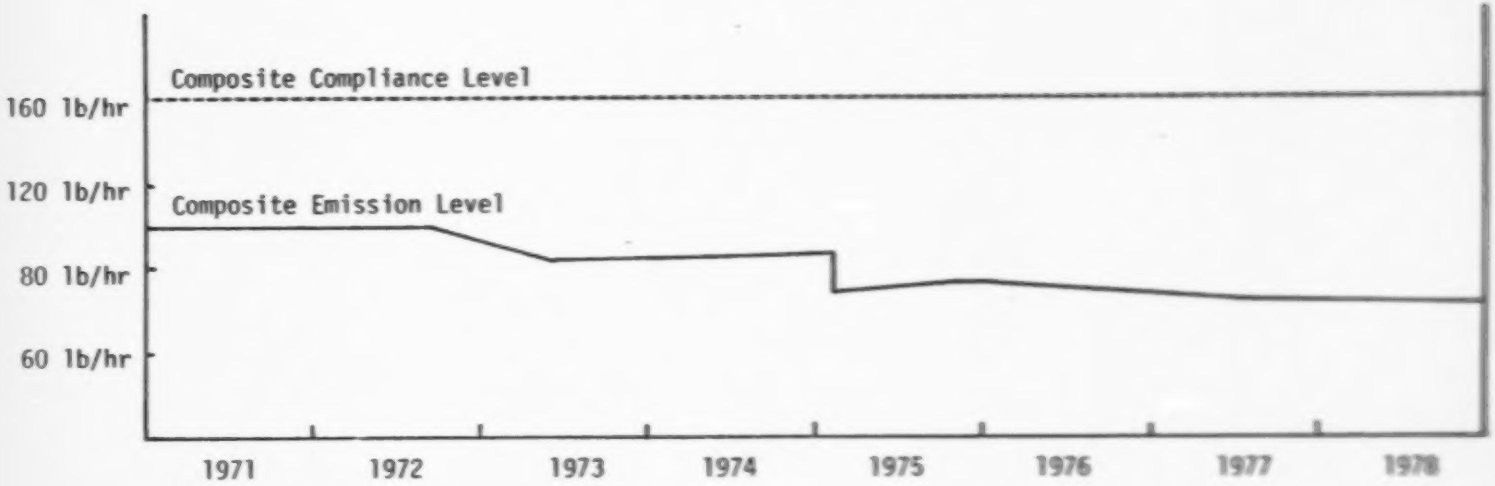
Baghouses have successfully replaced wet scrubbers on many of the hot asphalt plants in San Diego County. The success amounts to reducing the particulate emission rate by factors ranging from 0.4 to 3.0 per plant. (The composite emission reduction for the four asphalt plants is illustrated by Figure A.) One source (Asphalt Plants, No. 1) noted they had trouble meeting state specifications for asphalt after the conversion until they modified their baghouse. A second source (Asphalt Plant, No. 4) felt the conversion had improved their product. The difference in the experience of these two sources is primarily a function of time. The first source was the first asphalt plant to install a baghouse. The second source waited several years and received the benefit of improved applications of the technology.

A baghouse was installed on a sand processing source (Mineral Processing Plants, No. 2) to control emissions from the bulk loading operation. The baghouse was a dismal failure. It would blind if there was moisture in the atmosphere. The source was compelled to discontinue its use entirely and was eventually allowed to replace it with the wet scrubber technology they had originally proposed. In this case, the baghouse was an inappropriate control technology.

A baghouse was effectively installed to control wood dust emissions from a wood pulverizer (Lumber and Wood Plants, No. 1). The baghouse replaced a water spray in the cyclone. The emission level dropped from the range of 1 lb/hr to a negligible amount.

Another problem with forcing technology has occurred when the performance of the control equipment has not met the designed efficiency promised by the vendor. All of the sources which installed vapor recovery systems had this problem with the possible exception of a small pilot plant (Surface Coating, No. 1) built in 1978. In addition, the two incinerators had gross problems with their control equipment which failed to achieve promised performance. Subsequently, one (No. 2) shutdown operations and the other (No. 1) incurred substantial losses in

Figure A. Composite Emission Profile for Four Asphalt Plants



terms of time and money to bring the incinerator into compliance. Two sources (Food and Drug-related Industries, Nos. 1 and 2) went through at least one complete control system each trying to achieve odor abatement with little success.

In summary, for the sources which could install proven control techniques such as baghouses on asphalt plants, the emission reductions were dramatic and relatively nonproblematic. Where larger steps in the evolution of control technology were required, the emission reduction was erradic, e.g., the vapor recovery units on the two large sources (Petroleum Products and Handling, Nos. 2 and 3) vacillated between 95 percent efficiency and no vapor recovery.

NONTECHNICAL

The motivation to reduce emissions from stationary sources can come from a variety of actors. The source itself may seek to control the emissions as a "good neighbor effort" or "doing our part". This can not be underrated because without this spirit the regulatory effort would become overly burdensome and expensive. Members of the surrounding community can register complaints which have often become the impetus to reduce emissions. The regulatory agencies, in this case the APCD, have various legislated mandates and powers. Finally, the courts can be used to weigh delicate situations and order fines and/or compliance schedules.

Many of the sources had a stated company policy on environmental pollution. One such source (Surface Coating, No. 1) was running a pilot plant to determine, among other things, the efficiency of the pollution control equipment. Several other sources had a similar preventative approach to air pollution.

Other sources (Lumber and Wood Plants No. 1 and Mineral Processing Plants. Nos. 1 and 4) needed the prodding of the APCD to bring their processes into compliance. Still other sources had developed covert techniques of escaping from the APCD regulations (Asphalt Plants, No. 1 and Mineral Processing Plants, No. 3).

The sources which drew community complaints for nuisance violations also received a great deal of attention by the APCD. A large amount of pressure could be brought on the source, especially if the local newspapers began to treat the problem as newsworthy. The pressure was so great for at least one source (Aluminum Plants, No. 1) that they shut down a profitable section of their business when they found themselves caught between mounting APCD and community pressure to abate odors and the high cost of control equipment.

FINANCIAL

The cost burden of a source for air pollution control is a function of many variables such as: 1) the capital cost of the basic equipment, 2) the cost of the control equipment itself, 3) the profit margin, 4) the additional cost of maintenance and operation of the pollution control equipment, 5) whether or not the captured pollutant is a sellable product, and 6) the timeliness of implementation of new pollution control.

One source in the study claimed that all the control equipment on grain processing lines was cost effective (Grain Handling, No. 1). Another source claimed the reclaimed material dramatically reduced the cost of control (Petroleum Products and Handling, No. 1). Various sources made cost comparisons between control technologies and had settled for the BACT because it was also the most cost effective (Surface Coating, No. 1 and Asphalt Plants, No. 2).

The most costly pollution control operations were those which involved odor abatement (Food and Drug-Related Industry, Nos. 1-4, and Aluminum Plants, No. 1). Perhaps the most onerous pollution costs are the ones which cause the economic collapse of the facility (Incinerators, No. 2 and Aluminum Plants, No. 1).

As expected, small operations often incurred the largest percentage of control cost compared to the capital cost of process equipment (Incinerators, No. 1 and Surface Coating, No. 1).

Three tables have been included to summarize some of the diverse information collected during this Task II study.

Table A. SOURCE CHARACTERISTICS

Source Category	No.	Source Type	Control System Type	Pollutant	Source Size (TPY)	Control Size (ACFM)	Source Age	Control Age
1. Steam generating plants	1 2 3	Boiler Boiler Gas turbine generator	Two stage combustion steam injection Two stage combustion steam injection Fuel injection steam injection	NO$_x$ NO$_x$ NO$_x$	2,690 1,307 283	[b] [b] [b]	7 yr 5 yr [a]	5 yr 5 yr 7 yr
2. Incinerators	1 2	Incinerator Incinerator	Venturi scrubber None	Particulates Particulates	0.38 [a]	1,200 [b]	5-1/2 mo 6-1/2 yr	5-1/2 mo [b]
3. Petroleum products and handling	1 2 3	Petroleum bulk storage Petroleum bulk storage Petroleum bulk storage	Vapor recovery system Vapor recovery system Vapor recovery system	Hydrocarbons Hydrocarbons Hydrocarbons	3.1 493 16	[a] 550 125	6 yr 55 yr 16 yr	6 yr 6-1/2 yr 5 yr
4. Asphalt plants	1 2 3 4	Asphalt plant Asphalt plant Asphalt plant Asphalt plant	Wet scrubber Wet scrubber Baghouse Baghouse	Particulates Particulates Particulates Particulates	20.7 25.0 2.3 11.0	25,000 30,000 19,000 17,000	17 yr [a] 25 yr [a]	[a] 15 yr 1 yr 5 yr
5. Iron and steel plants	1	Strip boiler	None	Particulates	Minimal	[b]	[a]	[a]
6. Aluminum plants	1 2	Foundry Sweat furnace	Inert CO$_2$ blanket Baghouse[a]	Odor Particulates	[b] [a]	[b] [a]	3 yr [a]	3 mo [b]
7. Mineral processing plants	1 2 3 4	Perlite line Sand processing Rock crushing Rock crushing	Baghouse Wet scrubber Water spray and wetting agent Water spray and wetting agent	Particulates Particulates Particulates Particulates	2.1 [a] [a] 30.7	6,500 [a] [a] [a]	22 yr 50 yr 23 yr 10 yr	5 yr 5-1/2 yr 6-1/2 yr 5-1/2 yr
8. Grain handling	1 2	Grain handling Grain handling	Baghouse Baghouse	Particulates Particulates	[a] [a]	[a] [a]	62 yr [a]	8 yr 5-1/2 yr
9. Lumber and wood plants	1 2	Wood pulverizer Wood finishing	Baghouse Nonphotoreactive solvent	Particulates Hydrocarbons	0 [a]	1,000 [b]	[a] 5 yr	5-1/2 yr 6 yr
10. Surface coating	1 2	Surface coater Vertical degreaser	Carbon adsorber Condenser	Hydrocarbons Hydrocarbons	0.003 1.3	[b] [b]	5 mo [a]	5 mo 5-1/2 yr
11. Food and drug-related industry	1 2 3 4	Rendering plant Manure processing Canning Canning	Scrubber Scrubber Scrubber Scrubber	Odor Odor Odor Odor	[b] [b] [b] [b]	[b] [b] [b] [b]	25 yr 60 yr 3-1/2 yr 2 yr	6 mo 1 yr 3 mo 5-1/2 yr

[a] Not available

[b] Not applicable

Table 8. ECONOMIC CHARACTERISTICS/DATA AVAILABILITY

Source Category	No.	Source Type	Control System Type	Capital Cost of Control Equipment	Data Availability
1. Steam generating plants	1	Boiler	Two stage combustion steam injection	2,000,000	Stack test
	2	Boiler	Two stage combustion steam injection	3,500,000	Stack test
	3	Gas turbine generator	Fuel injection steam injection	381,000	Stack test
2. Incinerators	1	Incinerator	Venturi scrubber	35,000	Stack test
	2	Incinerator	None	b	Stack test
3. Petroleum products and handling	1	Petroleum bulk storage	Vapor recovery system	23,000	None
	2	Petroleum bulk storage	Vapor recovery system	615,000	VC unit efficiency test
	3	Petroleum bulk storage	Vapor recovery system	1,060,000	VC unit efficiency test
4. Asphalt plants	1	Asphalt plant	Wet scrubber	a	Stack test
	2	Asphalt plant	Wet scrubber	193,000	Stack test
	3	Asphalt plant	Baghouse	136,000	Stack test
	4	Asphalt plant	Baghouse	100,000	Stack test
5. Iron and steel plants	1	Ship boiler	None	b	None
6. Aluminum plants	1	Foundry	Inert CO_2 blanket	22,000	None
	2	Sweat furnace	Baghouse	200,000	None
7. Mineral processing plants	1	Perlite line	Baghouse	70,000	Stack test
	2	Sand processing	Wet scrubber	37,000	Stack test
	3	Rock crushing	Water spray and wetting agent	26,000	None
	4	Rock crushing	Water spray and wetting agent	37,000	None
8. Grain handling	1	Grain handling	Baghouse	4,300	None
	2	Grain handling	Baghouse	570,000	None
9. Lumber and wood plants	1	Wood pulverizer	Baghouse	55,000	None
	2	Wood finishing	Nonphotoreactive solvent	Minimal	Mass balance
10. Surface coating	1	Surface coater	Carbon adsorber	30,000	Stack test + continuous monitoring
	2	Vertical degreaser	Condenser	a	Mass balance
11. Food and drug-related industry	1	Rendering plant	Scrubber	200,000	Odor panel test
	2	Manure processing	Scrubber	140,500	Odor panel test
	3	Canning	Scrubber	75,000	None
	4	Canning	Scrubber	105,000	Odor panel test

[a] Not available

[b] Not applicable

Table C. EMISSION CHARACTERISTICS

Source Category	No.	Uncontrolled Emissions (TPY)	Allowable Emissions (TPY)	Percent Reduction Required	Excess Emissions	Excess as Percent of Allowed	Emission Credits
1. Steam generating plants	1 2 3	6,697 9,383 447	2,628 3,666 393	60.8 60.8 12.1	22 — —	0.8 — —	— 399 110
2. Incinerators	1 2	9.3 a	0.62 a	93.3 a	— —	— —	0.28 —
3. Petroleum products and handling	1 2 3	4.1 3,793 1,443	3.1 379 144	24.4 90.0	— 76 —	— 20.0	0 — 58
4. Asphalt plants	1 2 3 4	405.8 505.9 660 2,200	39.4 39.4 35.3 44.1	90.2 92.3 97.3 98.0	— — — —	— — — —	10.4 13.6 32.0 33.0
5. Iron and steel plants	1	b	b	b	b	b	b
6. Aluminum plants	1 2	b 4.0	b 0.9	b 77.5	b	b	b a
7. Mineral processing plants	1 2 3 4	63.0 a a 1,833	7.0 a a 37.6	88.9 a a 97.9	— — — —	— — — —	4.9 — — 0.9
8. Grain handling	1 2	a a	a a	a a	— —	— —	— —
9. Lumber and wood plants	1 2	3.6 a	1.6 a	55.6 a	— —	— —	1.6 —
10. Surface coating	1 2	1.4 a	3.1 0.9	— —	— —	— —	3.000
11. Food and drug-related industry	1 2 3 4	b b b b	b b b b	b b b b	b b b b	b b b b	b b b b

[a] Not available

[b] Not applicable

1.0 INTRODUCTION

PROJECT OBJECTIVES

In July 1978, the Council on Environmental Quality (CEQ) in association with the U.S. Environmental Protection Agency (EPA), contracted with Pacific Environmental Services, Inc. (PES) to study the "Effectiveness and Costs of Selected State and Local Regulations for the Reduction of Emissions to the Atmosphere From Stationary Sources" (Contract No. EQ8AC106). Under this contract, PES is to perform two case studies which will involve Chicago, Illinois, and San Diego, California.

The essential purpose of this study is to accomplish the following three objectives:

- To determine empirically the nature and extent of the response by stationary sources of air pollutants to existing state and local air pollution control agency regulations;
- To explain the reasons for the actual source responses; and
- To determine the relationship of various regulatory actions to pollutant emission reductions over time.

During the course of this study, particular emphasis is being placed on the degree to which pollutant emission reductions are achieved and maintained over time. The desired result of this study is to examine (as systematically as practicable) and determine the actual achievements, in terms of overall program effectiveness and associated costs of the state and local government, in bringing about the attainment and maintenance of the required pollutant emission reductions by stationary sources through direct regulation.

Each case study has the following three main tasks:

- An analysis of the regulatory process by focusing upon the rules, regulations, procedures, practices, and costs associated with the respective state and/or local control agencies;
- The performance of various individual stationary sources of air pollution in responding to direct regulation over time; and
- A determination of the effectiveness of agency activities in terms of costs, a comparison of all case study results to generic source categories, and recommendations for improving and/or replacing the existing regulatory process.

Draft and final reports associated with Task I, viz., description of the regulatory processes in Chicago and San Diego, have been completed. The report contained herein represents the data and results obtained by PES for the San Diego, California, case study regarding Task II of this study.

TASK II OBJECTIVES

The objectives of Task II are to measure source performance under agency regulatory programs, and to identify remaining emission problems based upon case histories and studies. Agency actions and source responses to these actions which occur during the pre-compliance and continuing compliance phases are identified. The emphasis is on identifying incidents of emission exceedances, and their causes and resultant emission levels.

The significance of this Task relates to the securing and analysis of source data that had not been available to public agencies prior to this time. Realizing that individual sources would be hesitant to participate in a study that might eventually lead to an enforcement action against them, it was initially agreed by all parties involved that the stationary sources visited by PES would remain anonymous to the CEQ and EPA, and the data obtained by PES would be handled confidentially. Without this assurance, sources would not have been likely to participate in this important aspect of our study. It was with this in mind that the source performance reports presented in Chapter 2 of this report are merely identified numerically under their respective generic categories.

The objective associated with performance reports on each source was to present information describing the source, the process being controlled, the pollution control system being studied, the costs associated with control system operation and maintenance, and factors associated with incidents of noncompliance. For the purposes of this study, a source was taken to mean a point of major discharge of a criteria air pollutant.

SOURCE SELECTION METHODOLOGY

The initial criteria associated with the selection of 20-30 sources involved their having abundant emissions data. This preliminary determination was confirmed by a thorough review of the San Diego Air Pollution Control District's files. In addition, a series of further criterion were applied which generally covered the following requirements:

- A broad base of source types;
- A broad base of source sizes; and
- All sources should have been in compliance at least at one time.

To cover a wide variety of sources, a list of 16 categories was developed at an early stage of this study. Subsequently, mineral acid plants and phosphate fertilizer plants were eliminated from this list, and food and drug-related industries were added. The stone, clay, and glass category was renamed mineral processing.

For the San Diego case study, the following categories did not apply because no sources in the categories were located in San Diego County:

- Pulp and paper plants;
- Cement plants;
- Brass and bronze plants; and
- Petrochemical plants.

Sources were selected to reflect both the corporate size of the source as well as the facility size. San Diego offered little choice as to type of ownership although one public utility was selected for further study. Considerable variation in the actual and potential emissions was determined to exist in the candidate sources.

Following a thorough review of agency files and discussions with San Diego APCD personnel, a preliminary list of 30 sources was selected for further study. Sources per generic category were as follows:

Steam Generating Plants	- 3
Incinerators	- 2
Petroleum Products and Handling	- 3
Asphalt Plants	- 4
Iron and Steel Plants	- 2
Aluminum Plants	- 2
Mineral Processing Plants	- 4
Grain Handling	- 2
Lumber and Wood Products	- 2
Surface Coating	- 2
Food and Drug-Related Industries	- 4
Total	- 30

Subsequent contacts revealed that one of the iron and steel category sources had gone out of business and one food and drug-related industry source refused to cooperate because they felt it would take too much time; there was no substitute available for the former, but a suitable alternative was found for the latter. The total sources selected for visits, therefore, was 29.

The final list of sources constituted the best mix of sources available considering size, ownership, pollutant, data availability, and compliance history.

SOURCE VISIT PROCEDURES

At an early stage of this study, procedures were developed for performing source visits. In large part, these drew upon our extensive experience in successfully executing industry visits and inspections. Immediately following the approval of sources by CEQ and EPA, representatives of the PES study team met with the EPA Project Manager to discuss source visit procedures; at that time a "dry run" of a source visit was performed. On the basis of this exercise, some minor modifications were made to the PES data collection instrument.

The next step was to forward a certified letter to each of the 29 sources (see Appendix A). This letter outlined the nature of our research study, and emphasized that source data and information would remain anonymous to the CEQ and EPA; emphasis was also placed on our interest in obtaining industry suggestions vis-a-vis changes in the stationary source air pollution regulatory process.

To follow up each source letter, Mr. Richard Baldwin, Chief, Surveillance and Enforcement Division, San Diego Air Pollution Control District, kindly agreed to telephone each source. This contact proved to be a significant assist in facilitating source visits since Mr. Baldwin had had numerous contacts with the sources and had developed a professional rapport with them. To answer technical questions, sources were encouraged to contact

PES study team members prior to the finalization of visit time and date. This served to eliminate any lingering doubts or uncertainties associated with the nature of our study as well as to facilitate the assembly of source background data prior to our visit.

Two members of the PES study team normally visited each facility; instances where the facility was a small operation only necessitated the visit by one PES study team member. In each case, PES personnel performing these visits were well experienced in performing source visits and inspections, and possessed the required technical background to understand the production and control processes involved. Prior to each visit, the San Diego APCD file on each source was thoroughly reviewed with regard to facility and control equipment characteristics as well as past permitting, compliance schedule and violation history. At each facility, discussions were held with individuals responsible for process, control and maintenance procedures, and tours were performed of the facilities and equipment. The site visits varied in time from a half day to a full day depending on the size of the source. The sources had been notified about the content of the interview/inspection prior to the arrival of the PES personnel and most often were prepared to actively engage in the dialogue which ensued. The sources were encouraged to submit any documentation for the information they released to PES. However, for the most part the source were less guarded with their information when the interview was kept in an informal format. Where discrepancies between records and the status of equipment were observed, these were noted. In those few cases where source personnel refused to answer our questions, these were also noted. The source reports have not been reviewed by the sources before inclusion in this report.

In many cases, sources were re-contacted following our initial visit and/or additional written or verbal information was obtained from the San Diego APCD in order to complete our source data file. In those instances where source personnel refused to answer selected questions, substitute data was either obtained from the source or the San Diego APCD; information which characteristically was of this type dealt with source capital costs.

We are extremely grateful for the assistance offered by Mr. Richard Baldwin of the San Diego APCD and the cooperation provided by each source in the course of preparing this study. Although information may be lacking in a few instances, we believe that we have been able to uncover as complete a data file on each source as is reasonably possible.

The following sections comprise a report of the Task II source performance data gathered to date by PES. Chapter 2 deals with a report of each source's performance per generic category; this comprises the major portion of this report. The format for each source performance report is arranged in the following order of topics:

- Facility Description
- Key Operations and Pollution Control Equipment
- Decision Making
- Financial Imapct
- Performance and Problems
- Chronology of Permits and Exceedances
- Emission Profiles
- Conclusion

It should be noted that all dollar values have been converted to 1978 figures by Consumer Price Index methods, and that all conversions are based on local San Diego fluctuations in inflation. For each source both annual and typical day emission profiles are provided; these contain explanatory notes as needed. The conclusions in each source report are specific to that source and relate directly to compliance/noncompliance casual factors.

The conclusions for Task II follow the Executive Summary. These seek to relate major factors associated with source performance and agency activities, and comprise a logical link with Task III activities.

2.0 CASE STUDIES

STEAM GENERATING PLANTS
Source No. 1

Facility Description

The source is part of a public utility system which supplies natural gas and electric power to domestic, commercial, and industrial customers in most of San Diego County and an adjoining portion of Orange County. The specific facility is a steam generating plant located on approximately 40 acres with neighboring residential, industrial, and agricultural land use. The plant normally operates 24 hours/day, 7 days/week, 52 weeks/year.

Key Operations and Pollution Control Equipment

The facility consists of four fossil fuel fired water-tube boilers which feed turbine generators for the production of electricity. In addition, there is a General Electric 20 megawatt gas turbine utilized as a peaking unit. On a plant wide basis the primary fuel combusted is No. 6 fuel oil. Natural gas is used occasionally.

The unit selected for review is a 1964-installed Riley Stokes vertical pass, front and rear turbo-fired steam generator. Until 1973, firing was accomplished with twelve mechanically atomized oil burners and twelve spud type gas burners. During that year the mechanically atomized burners were converted to steam atomization to reduce nitrogen oxide (NO_x) emissions. The units maximum output is rated at 215 megawatts.

Pollution control is accomplished by the use of steam atomized oil burners and the injection of overfire air to allow staged combustion. Both approaches reduce peak flame temperatures and result in lower NO_x emissions. The facility also utilizes a magnesium based fuel oil additive to convert sulfur trioxide (SO_3) in the exit gas stream to a ph-neutral salt [magnesium sulfate ($MgSO_4$)]. This results in an average 93 percent reduction in the formation of sulfuric acid (H_2SO_4) particles.

Decision Making

Principal decisions are made at the corporate vice-president level. The primary concern has been NO_x reduction and compliance while fulfilling electrical demands and minimizing the cost of controls. Since the unit had been in operation for several years before NO_x regulations became effective, the decision was made that control should be accomplished by modifying the operation parameters and support systems of the unit.

Other decisions involve the mix of generating units required to meet load demands at any given time. This is carried out on a network basis. Units are brought on line in ascending order of heat rate, taking into account individual unit restrictions relating to emissions. At the operating level decisions primarily relate to the maintenance and operation of controls, and the timing of soot blowing. The preferred time for soot blowing is when easterly winds prevail. These winds carry pollutants over the ocean rather than toward residential areas.

Financial Impact

The original cost of the boiler was approximately $9,516,000. Permit file data indicates that controls in the form of burner modifications were added in 1970 at a cost of $753,000. Company personnel stated that by 1973, the boiler control costs had exceeded $2,800,000. These additional costs included the capital costs of controls such as NO_x controls, storage tank insulation, and viscosity controls; research, study, and control costs; cost of purchased power necessary to offset the loss of generating capacity resulting from derating of boiler output to meet NO_x standards; and the differential cost of environmentally cleaner fuels such as low sulfur fuel oil. The operating costs for the control of NO_x are estimated to range from 2.3 to 2.7 percent of fuel costs because of heat efficiency losses.

Performance and Problems

The control of nitrogen oxide emissions have presented the greatest difficulty in the operation of this boiler. This unit has complex combustion air controls which are subject to corrosion and require substantial maintenance. Even with the maintenance program there has been a persistent problem of maintaining proper fuel-to-air-ratios. The NO_x emission rate hovers just above the compliance level.

The other major problem, which involves all four boilers at the facility, has to do with acidic particulate fallout. This problem was approached as a public nuisance, arising from citizen's complaints, because the particulate emission standard was not exceeded. The acidic particles result from the conversion of sulfur trioxide (SO_3) in the exit gas stream to sulfuric acid (H_2SO_4) in the presence of water. The fallout is evidenced by the deposition of acidic carbonaceous oil and ash particles which can cause property damage. These damages were the basis of the citizens complaints previously mentioned.

To counter the acidic particulate fallout problem, the facility conducted a major study at another plant which resulted in the institution of a fuel viscosity control program to improve combustion and the use of magnesium oxide as a fuel additive to neutralize and inhibit acid particle formation.

Chronology of Permits and Exceedances

The boiler has received Permits to Operate since that program was initiated by the Air Pollution Control District. There were regular exceedances of the nitrogen oxide emission standard from December 1971, when the limitations became applicable, to December 1972; however, the unit was operating under a variance. During this twelve month period, the facility was developing a nitrogen oxide control plan.

In January 1977, an Abatement Order was issued concerning the problem of acidic particulate matter fallout from the four boilers. Several neighboring residents had complained about property damage caused by the fallout.

An emergency variance was issued during the month of March 1977 for NO_x emissions while the unit was on a high nitrogen/low sulfur fuel oil testing program.

The facility submitted an abatement plan and compliance schedule relating to the acidic fallout problem in December 1977. The plan called for the use of a magnesium based fuel oil additive to convert sulfur trioxide in the exit gas stream to a ph-neutral salt (magnesium sulfate). Based on a test program in another facility, this would result in an average 93 percent reduction in the formatin of sulfuric acid particles. In addition, the soot blowing schedule was altered to take advantage of easterly winds when possible so that pollutants would be carried over the ocean rather than inland.

Emission Profiles

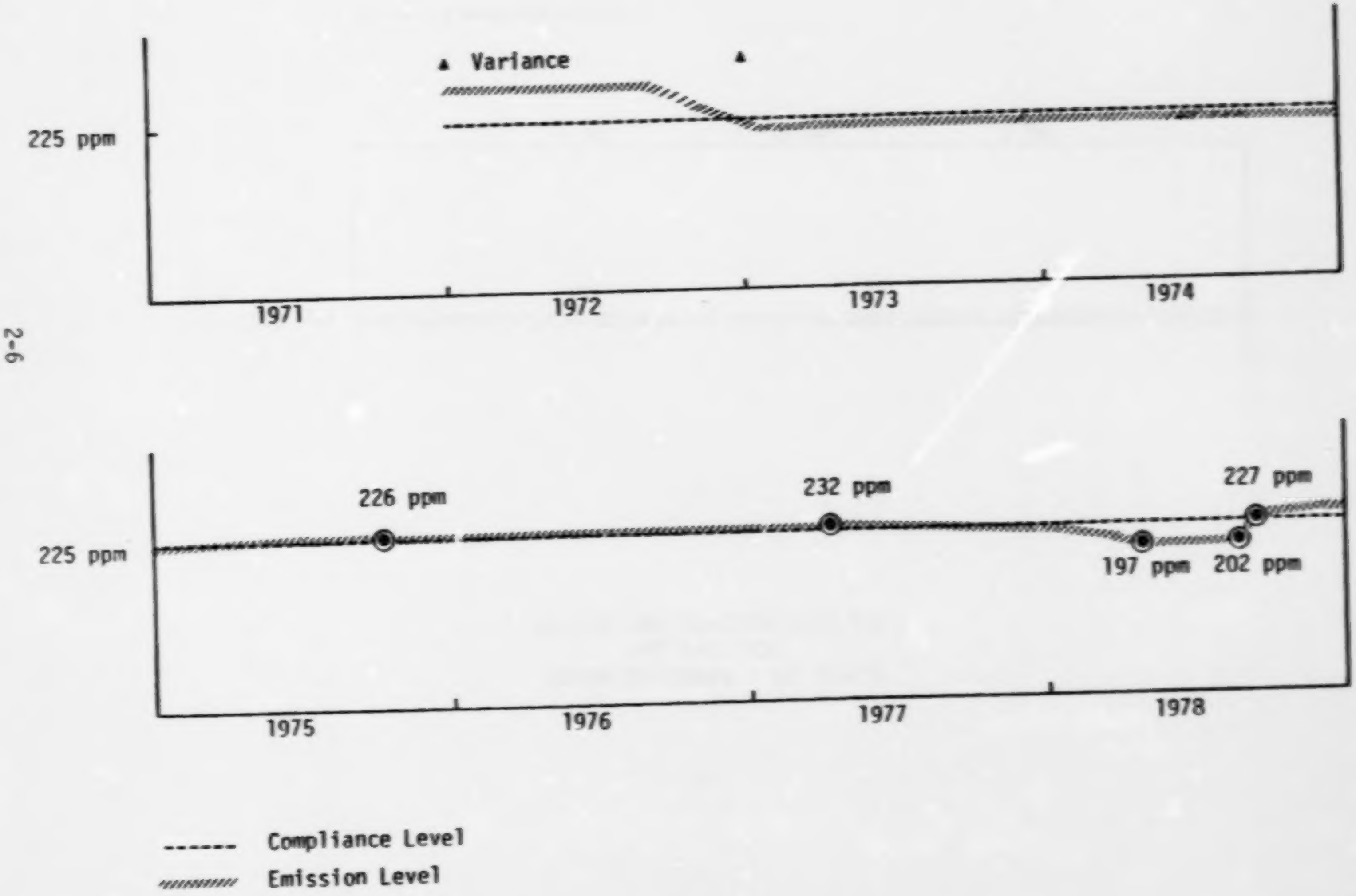
The compliance level for NO_x while burning fuel oil is 225 ppm. When the regulations were first promulgated, the sourc was granted a variance for a year inorder to adjust the boiler. Staged combustion and steam injection were installed. The boiler has been tested regularly in the last four years. The tests show that the boiler emits NO_x around the compliance level. The SDAPCD has been reluctant to issue a violation notice since the test results are so close to the compliance level.

It should be noted that the emission profile has been drawn for burning fuel oil only. The boiler is occasionally readjusted to burn natural gas. The source was unable to provide PES with the dates during the last eight years when natural gas was used. Consequently, the profile reflects only the use of fuel oil which is the normal fuel.

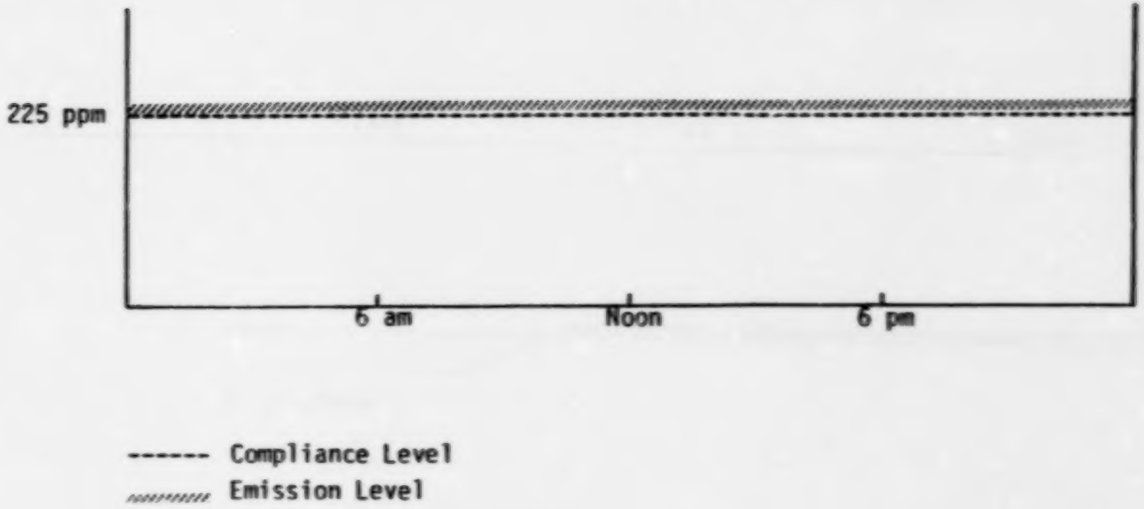
Conclusion

The source is a steam generating boiler, normally fired by No. 6 fuel oil. The NO_x emission are controlled by staged combustion and steam injection. The source has tried to balance electrical generation efficiency against NO_x production in its approach to pollution control. Currently the NO_x emission level hovers slightly above the 225 ppm compliance level.

STEAM GENERATOR - OIL FIRED
NO_x EMISSION



STEAM GENERATOR - OIL FIRED
NO_x EMISSION
TYPICAL DAY EMISSION PROFILE



STEAM GENERATING PLANTS
Source No. 2

Facility Description

The source is an electrical power generating plant with five boilers. The total capacity for the plant is 986 MW. Power generation varies substantially on a diurnal basis. Although exact figures were not readily available, it would not be unusual for the peak daily demand to be three times that of the minimum. The peak demand period of the day is usually in the afternoon and the minimum in the nighttime hours. The plant is located on the ocean and uses sea water for cooling. This plant is part of a larger system of plants which jointly satisfy the electrical demand in the San Diego area.

Key Operations and Pollution Control Equipment

For the purpose of this study one boiler has been chosen to typify the plant. This boiler is a Babcock and Wilcox model with maximum heat input rating of 3,047 million Btu/hr. The boiler has a generating capacity of 300 MW. Nitrogen oxides are controlled by a combination of two stage combustion, off-stoichiometric firing, and flue gas recirculation. The fuel oil burned has a low sulfur content (< 0.5% by weight) to reduce sulfur oxides. The plant uses a magnesium oxide based fuel additive to reduce the acidic particle fallout in the community. Finally, the plant has instigated a soot blow out procedure which limits blow outs to periods when the wind blows towards the ocean.

Decision Making

The source stated three basic goals where used in developing their environment policy: 1) attaining compliance, 2) meeting electric load demands, and 3) minimizing the cost of control. An emissions task force was formed at the corporate level to determine the emission control strategy.

Day to day operating decisions are made at the plant and primarily relate to controlling flue gas recirculation and combustion conditions so that nitrogen oxides emission standards are not exceeded. Decisions are also made for the exact time of soot blowing.

Financial Impact

The initial capital cost for the boiler was $19,900,000 for the basic equipment and $3,500,000 for control equipment. The operating costs for the nitrogen oxides controls are estimated to range from 2.3 to 2.7 percent of fuel costs because of heat efficiency losses.

A large study of particulate fallout was conducted at the plant in 1976-77. While this study produced results generally applicable to the burning of residual fuel oil, much of the stimulus for the study was from compliants about property damage in the vicinity of the plant. The study which encompassed emissions evaluation, combustion engineering, and air quality impact was contracted with a private consulting firm for $385,000. This study resulted in the use of an additive and oil viscosity control. The cosity controls involved temperature sensing, oil heating, and tank insulation. The additive to the fuel oil was magnesium oxide which cost approximately $150,000/yr for this boiler.

Performance and Problems

The source regularly operates in compliance with the emission standards of the APCD. Source tests indicate that NO_x emissions while burning oil or natural gas are always under the compliance level. Sulfur dioxide and particulate emissions are substantially under that allowed.

The source is required to use a magnesium oxide based fuel additive to reduce acidic particulate fallout during the burning of residual fuel oil. The source must also control the soot blowing operation so as to minimize the fallout impact. This is accomplished by blowing soot during the period of day when the wind carries the emitted material towards the ocean rather than the land.

Chronology of Permits and Exceedances

This boiler was constructed in 1971-72. In August 1973, the boiler received a violation notice for excessive smoke. The operating permit was granted in January 1974, and has been renewed annually.

In April 1976, the APCD filed an abatement order before the APCD Hearing Board which dealt with the acidic particulate fallout in the nearby community. The source did not oppose the order and conditions were set. The source would: 1) award a contract to a consulting agency to study the problem, 2) regularly provide the APCD with progress information, 3) make restitution to the property of neighbors, and 4) submit a compliance schedule to the APCD for approval. In June 1976, the source made restitution to 43 neighbors. In November, the source obtained a 30 day emergency variance to permit exceedances of the nitrogen oxide rule while testing a low sulfur-high nitrogen fuel oil. Finally, a compliance schedule was set for a year's time on December 1976.

Emission Profiles

The steam generating boiler is normally fired with No. 6 fuel oil. On occasion natural gas is substituted. However, this has not been indicated on the emission profile since the source declined to resolve the time frame when natural gas was used.

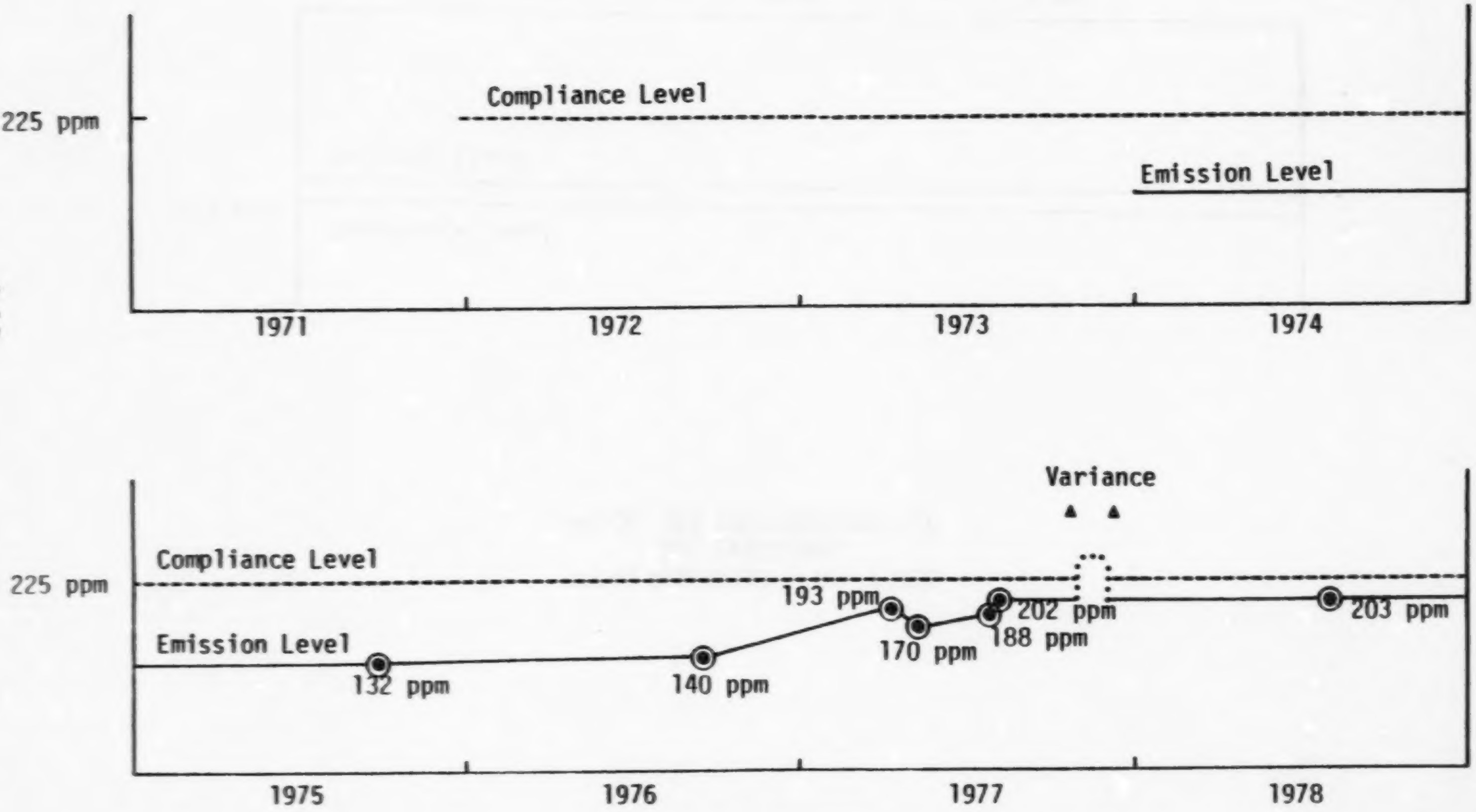
The NO_x emission level has slowly crept upwards towards the compliance level over the last four years. The source tests indicate the compliance level has not been breached except in late 1977 when the source was experimenting with a high nitrogen fuel oil. During the experiment the source was exempted by a variance.

Currently, the boiler normally runs 24 hours per day and is fully within the compliance limit.

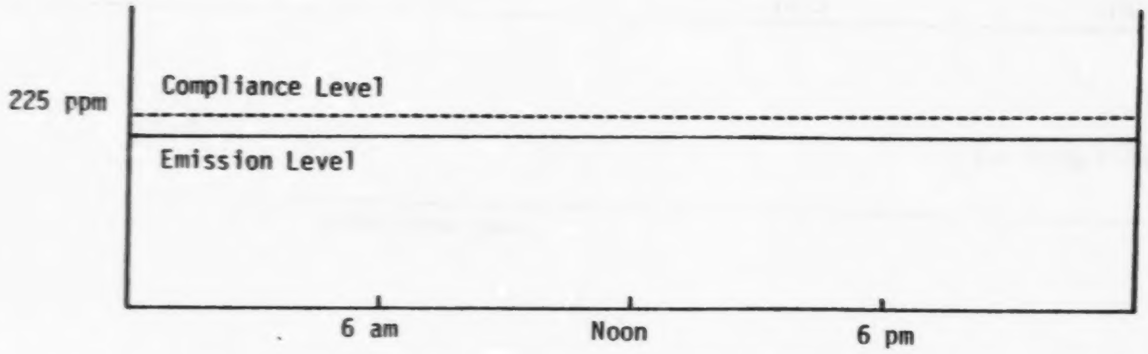
Conclusion

The source is a steam generating boiler used to produce base load electricity. The boiler is normally fired by No. 6 fuel oil. The NO_x emissions are controlled by staged combustion and steam injection. The source has successfully kept the NO_x emissions below the compliance level for the entire five years of operation.

STEAM GENERATOR - OIL FIRED
NO$_x$ EMISSIONS



STEAM GENERATOR - OIL FIRED
NO_x EMISSIONS
TYPICAL DAY EMISSION PROFILE



STEAM GENERATING PLANTS
Source No. 3

Facility

The source is part of a public utility system which supplies natural gas and electric power to domestic, commercial, and industrial customers in most of San Diego county and an adjoining portion of Orange County. This facility has 216 employes and is located on a 17 acre site.

Key Operations and Pollution Control Equipment

The facility equipment includes several gas turbine generators for the production of electricity during peak load demands and during system emergencies. All of the turbines operate on an interruptible natural gas service basis with diesel oil utilized as the standby fuel.

The unit selected for review is an industrial gas turbine, Model PG 5221-M, supplied by the General Electric Company and installed in 1972. The unit is equipped with an atomizing air fuel injection system which can operate on either natural gas or diesel fuel. The unit is rated at 299 x 10^6 Btu/hr with a peak power output of 23 megawatts. The base power production rate is 18 to 20 megawatts. This generator is designed to provide power during peak load conditions.

Gas turbines have been used increasingly in recent years as peak load generating units because of their rapid startup and shutdown time. There is little problem with sulfur emissions because these turbines combust only diesel fuel or gas. However, excellent fuel atomization is required to reduce particulate emissions and gas turbine exhaust opacity. For these reasons, an atomizing air system was installed to improve the combustion process rather than a mechanical atomizing system. Turbines also operate with considerable excess air and without proper controls will emit significant quantities of nitrogen oxides. Key operations are thus oriented toward maintaining the fuel injection and atomization system, and in maintaining nitrogen oxides control system.

The only continuous pollution control equipment is that for nitrogen oxides (NO_x). The turbine generator utilizes both steam and water injection for NO_x control. Steam is injected into the combustion chamber through a throttling mechanism controlled by the turbine compressor discharge. The steam is injected at a rate varying from 0 to 14,000 lb per hour. The water injection system utilizes a flow rate of up to 15 gallons per minute with the turbine exhaust temperature as the control parameter for the quantity of water injected. The water is by a specially constructed nozzle directly into the reaction zone of the flame.

Decision Making

Principal decisions are made at the corporate vice-president level. The primary concern has been pollutant reduction and compliance while fulfilling electrical demands and minimizing the cost of controls. Other decisions include the mix of generating units required to meet load demands. This is carried out on a network wide basis.

Decisions made at this facility are operational in nature and relate primarily to the control of nitrogen oxides. The principal problem is maintenance of the fuel injection and water and steam injection systems, together with their associated controls.

Financial Impact

The gas turbine generator cost $2,835,000. The attendant NO_x

pollution control equipment cost $365,000 or approximately 13% as much as the generator. The principle operating and maintenance for the turbine generator are steam and water costs for NO_x control and the cost for reduced efficiency due to these controls.

Performance and Problems

There have been few problems with this particular unit. Source tests conducted by the San Diego County have shown the unit to be in compliance with all emission standards. The greatest potential for rule violation is with nitrogen oxides and visible emissions. There are no continuous emission monitoring instruments in use at the plant. Thus, there must be reliance on correlation between operating conditions and emissions observed during regular source testing.

Chronology of Permits and Exceedences

This unit received an initial operating permit in 1972 and has received a renewed operating permit in subsequent years. There is no history of standard exceedences.

Emission Profile

An emissions profile could not be prepared for this source because the schedule of its use was unavailable. The generator is normally used during peak load conditions. It can be fired by either natural gas or diesel fuel.

The generator has been tested for NO_x emissions three times in the last two years firing diesel fuel with the following results: 223 ppm on May 31, 1977; 217 ppm on April 18, 1978; and 162 ppm on June 7, 1978. The last test had a notably lower emission rate because of more steam being injected during the firing.

Conclusions

The source is a gas turbine which is used during peak load conditions. There have been no noted NO_x emission problems during its six years of operation.

INCINERATORS
Source No. 1

Facility Description

The business involves incineration of contaminated hospital waste. The incinerator is located in a mixed residential, agricultural, and light industrial district. The plant has 5,000 square feet, much of which is unused. Presently, one person is employed at the site. He picks up the contaminated waste in a truck and runs the incinerator. Normal operations fluctuate presently according to the load. Theoretically, burning can occur anytime during the week. The incinerator has been in operation for only 6 months.

Key Operations and Pollution Control Equipment

The air pollution problem is particulate emissions from a multiple chamber incinerator with a Model Tyler venturi scrubber. The incinerator has a 675 lb/hr capacity.

Decision Making

This small plant is a branch of a much larger operation in Orange County. The management decisions are made in the home office. The one employee at the site merely carries out routine assignments.

The pollution control equipment is not monitored. It is conceivable that an air quality violation could go unheeded for days until the supervisor came down on his rounds.

Financial Impact

The cost necessary to bring the incinerator into compliance was about $35-40,000 which was about 50 percent of the total cost to set up the plant. Included in the cost of pollution control besides the venturi scrubber were: 1) extra testing and modifications to the original scrubber, $8-10,000; 2) correcting the noise from the fan on the scrubber, $6,000; and 3) the sewer connection for scrubber waste water, $5,000. Obviously, correcting the faulty control equipment has greatly inflated the cost of pollution control.

The operating cost for the scrubber is about $3,000 per month. This includes water, gas, and electricity.

Performance and Problems

The initial permit to operate the incinerator was denied by the San Diego APCD following a performance test of the particulate emissions. The venturi scrubber did not meet the specification detailed by the vendor. The scrubber was modified and the amount of water recycled was dropped from full recycle to 50 percent recycle. The incinerator was retested and again failed to reach the compliance level. In the third test (July, 1978) the scrubber used only 25 percent recycled water. The emission rate was within the compliance level and the APCD granted a permit to operate. Subsequent to the compliance problems, the source has brought a law suit against the vendor of the venturi scrubber for failure to meet specifications.

The venturi scrubber was shut down because of a noise problem with the fan on the day of the site visit by the authors. However, it could not clearly be ascertained whether or not burning would continue even without the benefit of an air pollution control device.

Chronology of Permits and Exceedances

In August, 1977, the source obtained a permit to construct a multiple chamber incinerator with a Model Tyler scrubber. In May, 1978, the initial permit to operate was denied because the scrubber failed to pass the emissions test. Again in June, the scrubber failed to meet the emission standard. Finally, in July, the permit to operate was granted.

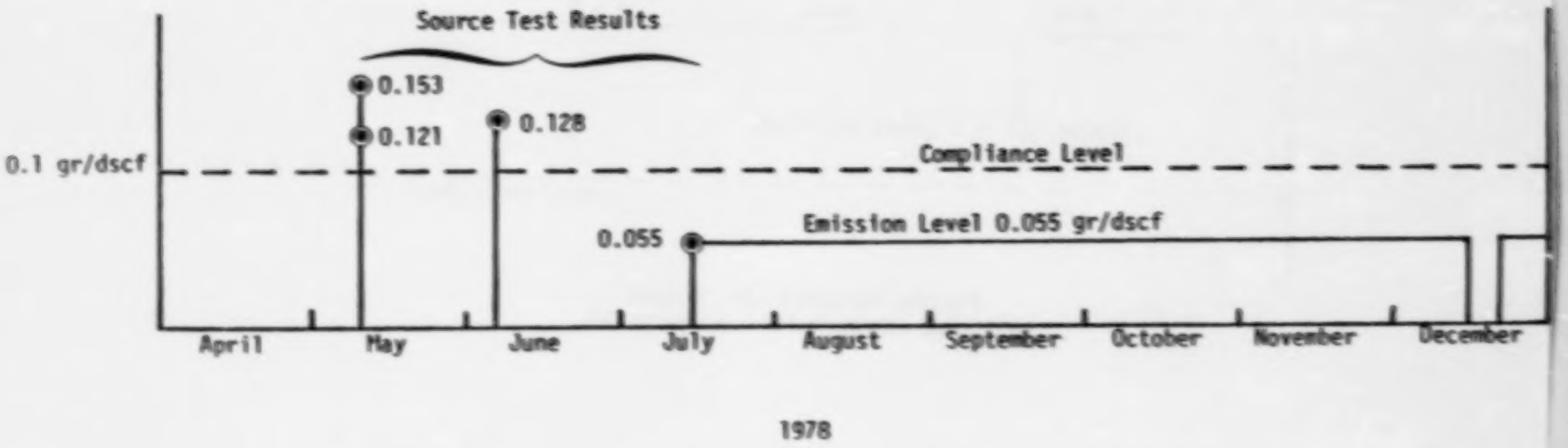
Emission Profiles

On the first three source tests the incinerator failed to achieve the desired 0.1 gr/dcsf compliance level. The scrubber water recycle rate was decreased from 100 percent to 25 percent. The source was retested in July 1978. The emission rate was 0.055 gr/dscf. The source has performed well since the testing except for a shutdown in December to correct a noise problem with the scrubber fan.

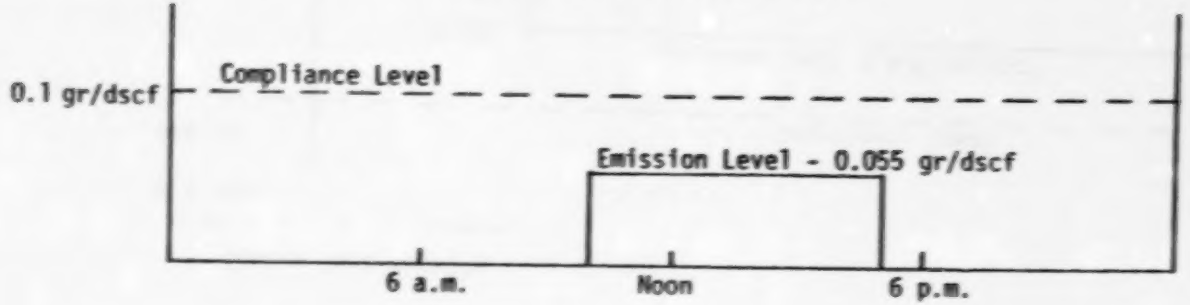
Conclusion

The source incinerates contaminated hospital waste. The multichamber incinerator is controlled by a venturi scrubber. About 50 percent of the total cost to set up the plant was spent on bringing the incinerator into compliance. This figure was inflated by the failure of the scrubber to meet vendor specifications. Presently, the incinerator is in compliance.

INCINERATOR - PARTICULATE EMISSIONS



INCINERATOR - PARTICULATE EMISSIONS
TYPICAL DAY EMISSION PROFILE



INCINERATORS
Source No. 2

Facility Description

The source is a hospital providing services of general medicine and surgery which is owned by the United States Government. The facility, which employs 1,700 persons, operates 24 hours/day and 365 days/year and is located on 32.6 acres in a semisuburban area.

Key Operations and Pollution Control Equipment

For the purposes of this study, the facilities support plant is the area of concern. The plant consists of three 36 x 10^6 Btu/hr Hercules water tube boilers. The boilers are primarily fired on natural gas and are equipped with standby diesel fuel firing capabilities. There is no pollution control equipment associated with this equipment. Normal rotating operations dictate that a boiler is on-line for 30 days and is off-line for 60 days.

The principal air pollution concern at the facility centers around the 1,000 lb/hr capacity Clean-Air-Ator Corporation, Model 1000 G-P multiple chamber incinerator. There is no pollution control equipment on the incinerator.

Decision Making

Decisions regarding the facility are made on the premises by the chief engineer, with major decisions being subject to approval by the administrator of the hospital. Major capital expenditures are approved by the board of directors. After the incinerator vendor declared bankruptcy, it was decided to hire a contractor to finish the installation of the control panels. When the incinerator was declared out-of-compliance by the APCD, the chief engineer decided to contract the waste to an incineration service until modifications could be made.

Financial Impact

The capital cost of the incinerator was $121,500. The yearly cost of operation for the unit consists of approximately $16,000 for salary, $17,000 for fuel, and $1,400 for maintenance for a total of $34,400. When the facility contracted its waste to an incineration service, estimated yearly costs were $26,400. Modifications to bring the incinerator into compliance are expected to cost $275,000 to $300,000. It must be noted that an undefined portion of this cost is to convert the incinerator into a full time operation, equipped to burn all types of waste and to install a waste heat boiler for energy conservation.

Performance and Problems

Installation of the incinerator started in early 1974. The unit installation was completed, but the vendor went bankrupt in May 1974 before the control panel was installed. The facility hired a contractor to complete the installation of the control panel. Problems were encountered during the installation due to wiring discrepancies. The unit was operable by late 1974 but was very unreliable, since the burners would not maintain ignition. Modifications by the contractor continued, but the reliability problem remained. Modifications were performed on the burners and wiring of the control panel until spring of 1976, when a packaged control panel was ordered and installed. The unit became fully operational in summer 1976.

The unit was tested in November 1976, but the test calculations ignored several critical parameters and the test was unacceptable. The unit was tested on March 21, 1977 by the APCD and was emitting particulates at the rate of 2.32 gr/dscf. The source was again tested on November 1977 at an emission rate of 1.15 gr/dscf. The unit was declared out-of-compliance by the APCD in mid-1978, and the facility was advised to correct the problem. The unit was shut down, and wastes are sent to an incineration service. The unit can be operated on an emergency basis as a condition of the variance if the incineration service experiences a breakdown.

Chronology of Permits and Exceedances

In early 1974, the facility applied for and was granted an Authority to Construct for the incinerator. The unit was source tested by the APCD in March 1977 and found to be out-of-compliance with the 0.1 gr/dscf emission limitation. The source was emitting 2.32 gr/dscf. The burners were modified and the unit was again tested in November 1977 with an emission rate of 1.15 gr/dscf.

Due to the Clean Air Act Amendments of August 1977, the facility was advised that it would have to apply for permits to operate. These applications were submitted in March 1978, and all were granted in July 1978 with the exception of the permit for the incinerator. The facility was advised by the APCD that it would need a variance to continue operations of the incinerator. A conference regarding the problem was held between the APCD and the facility. The facility applied for an Environmental Impact Assessment from the Environmental Review Board in preparation for the variance hearing. The Board declared there would be minimal environmental impact if the operation continued. The hearing procedure was started in August 1978 and was continued to September 1978. A variance was granted until April 1, 1979 with conditions that the facility dispose of waste by an incineration service, and that the facility could operate its incinerator on an emergency basis only if the service experienced a breakdown of its equipment. There are no records of Notices of Violations having been issued.

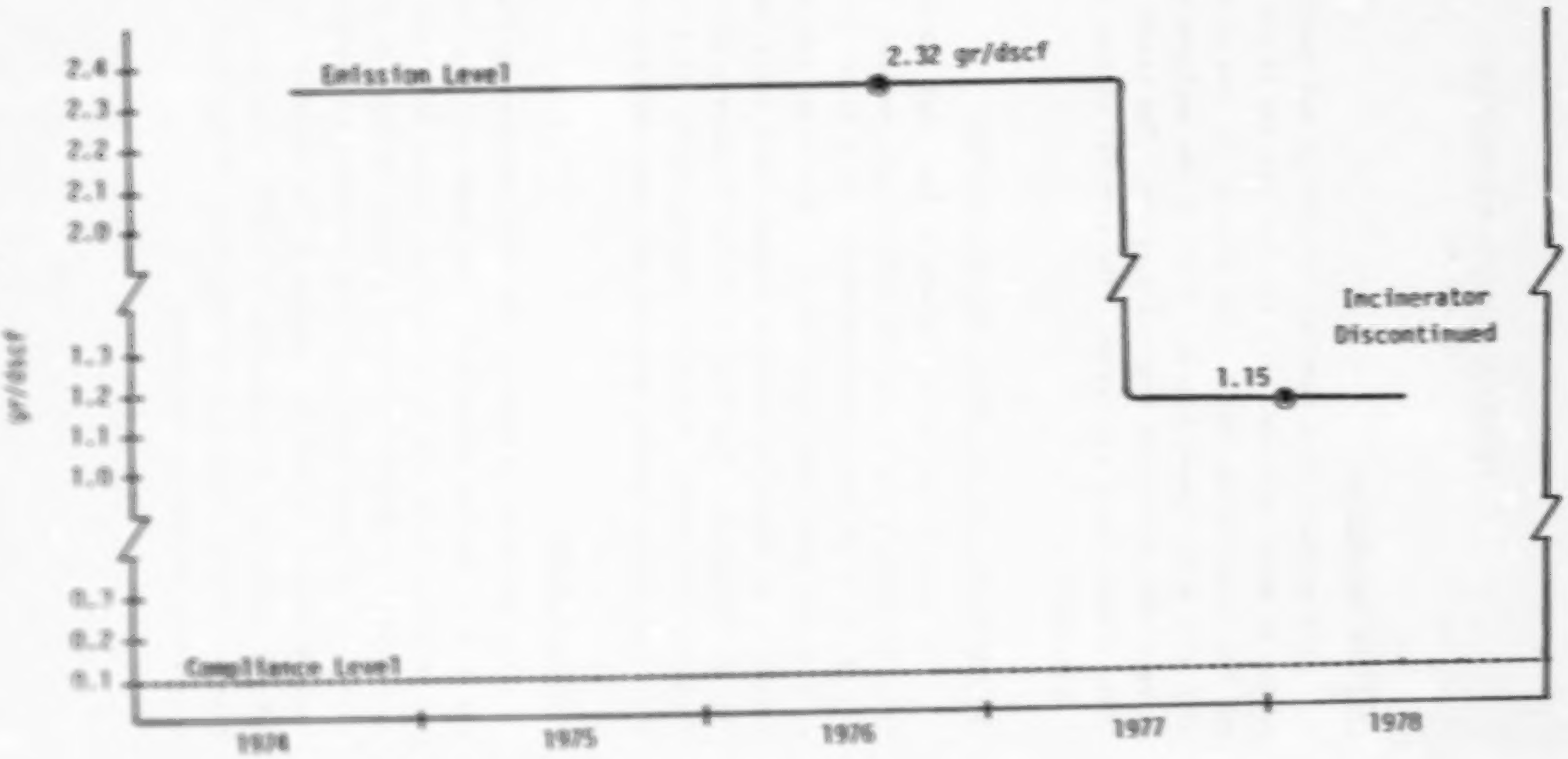
Emissions Profile

The first acceptable source test was performed in March 1977, and the unit was tested again in November 1977. It was assumed that operating parameters have remained reasonably constant since the unit commenced operation, and no major process modifications were performed. The first source test is assumed to be representative of previous operations, since efforts to reduce particulate emission levels were undertaken after that test. Emission levels after the second test were assumed to remain the same, since discussions of corrective actions needed and variance procedures occurred during summer 1978. The unit operated approximately 2 hours per day.

Conclusions

Many of the facility's reliability problems can be directly linked to the bankruptcy of the vendor prior to completion of the installation. Portions of the equipment and wiring diagrams needed for the control panel were not supplied, but the contractor tried to make the existing system operable by supplying the missing equipment. These efforts failed, and a package system was installed. The reliability problems of the unit were directly related to the control panel. Modifications to the operation of the burners and their operating parameters reduced emissions by approximately 50 percent, however this rate was 11 times greater than the allowable mandated by regulation. A portion of this problem can be attributed to the high amount of plastics included in the waste and possibly incorrect stoking procedures. The facility was not subject to APCD administrative procedures until passage of the Clean Air Act Amendments in 1977. The addition of pollution control equipment will resolve the performance problems.

INCINERATOR-PARTICULATE EMISSION
OPERATING 2 HRS/DAY



PETROLEUM PRODUCTS AND HANDLING
Source No. 1

Facility Description

This business is a terminal for storage and loading into tank trucks of motor gasoline. The terminal has one 20,000 barrel tank and two 10,000 barrel tanks. The terminal is located on a two-acre site with good freeway access. There is one employee whose main job is receiving deliveries from the pipeline. The trucks are loaded by their drivers via a key system. The terminal is open 24 hours/day, 7 days/week.

Key Operations and Pollution Control Equipment

The main air pollution concern is fuel vapor emissions. The fuel is received via a pipeline with a vapor recovery system consisting of: 1) a 525 CFM rotary compressor, 2) a 33-ton Vilter chiller, and 3) a 30,000 cubic feet vapor holder. This vapor recovery system is operated by an adjoining pipeline company which rents the service according to throughput. The fuel is stored in above-ground pontoon-type floating roof tanks. The truck loading occurs via a loading rack with four bottom loading arms and two vapor recovery arms.

Decision Making

The decisions concerning the vapor recovery control strategy are made by the top executives. The responsibility for inspection and maintenance of the vapor recovery system to insure performance, is not well delegated. The only company employee at the site is primarily concerned with receiving shipments and keeping records. Routine inspection and maintenance of the equipment for vapor loss are not scheduled. Consequently, the APCD inspectors, in their biannual visits, have occasionally found faulty seals on the tanks which were unknown to the source.

Financial Impact

The most costly segment of the vapor control system was between the pipeline and the terminal. The pipeline company installed this segment of the system and charges the source 1.66 cents/barrel throughput. This expense to the source is offset by the return of approximately 100 barrels/month of fuel from the condensed vapor.

At the terminal, a top-loading system was replaced by Parker-Hannifin Model V1007 vapor recovery system with bottom-loading arms and dry break couplers. The new system cost $23,000. The source estimates the replaced top-loading system could have been in service for an additional 30-40 years.

Performance and Problems

The vapor recovery systems between the pipeline and the storage tank and between the storage tanks and the loading trucks have performed to specifications. There have been no violations of the San Diego APCD's regulations on this account. However, the source has had intermittent problems with the seals on the floating roof tanks. The original Permit to Operate was held up for several months as the source tried to secure the seals. Two years later, the source received a Notice of Violation primarily for faulty seals.

The source is very proud of its record of compliance with the 90 percent vapor recovery regulation. However, the representatives of the company were anxious about the pending 95 percent recovery requirement and whether their terminal and gas stations could comply without financial hardship.

Chronology of Permits and Exceedances

In December 1973, the source was granted the authority to construct three gasoline storage tanks and a bottom-loading rack for trucks with a vapor recovery system. The permit to operate was held up twice in 1975 because of inadequate seals on the storage tanks. In January 1976, the permit was granted.

In the fall 1977, the source received a notice of violation for a faulty seal on a floating roof tank. The source petitioned and received an interim variance for 3 months. The interim variance was extended 1 month and compliance was met by February 1978.

Emission Profiles

The 1,000 bbl gasoline storage tank was inspected twice in 1975, and found to have faulty seals. By January 1976, the situation had been corrected. Again in late 1977, the tank was inspected and cited for a faulty seal. The problem was corrected by January 1978. The condition of seals is a permit requirement. There is no compliance level.

The corrected emission rates for good and faulty seals was obtained from AP-42, Compilation of Air Pollutant Emission Factors, pages 4.3-12 and 13:

$$L \text{ standing} = 9.21 \times 10^{-3} M \left[\frac{P}{14.7-P}\right]^{0.7} D^{1.5} V_w^{0.7} KtKsKpKc$$

$$L \text{ withdrawal} = \frac{22.4dC_F}{D}$$

Assumed values will be:

M = 66 molecular weight
P = 5.2 psia
D = 42 ft
V_w = 6.3 mph
Kt = 0.045
Ks = 1.00 for good seals, 1.33 for faulty seals
Kp = 0.9
Kc = 1.0
d = 5.6 lb/gal
C_F = 0.02

Faulty Seals

$$\text{Ls (lb/day)} = 9.21 \times 10^{-3}(66)\left(\frac{5.2}{14.7-5.2}\right)^{0.7}(42)^{1.5}(6.3)^{0.7}(0.045)(1.33)(0.9)(1.0)$$

$$= (0.608)(0.656)(272)(3.63)(0.045)(1.33)(0.9)(1.0)$$

$$= 21.2$$

$$= \underline{3.87\ \text{TPY}}$$

$$\text{Lwd (lb/}10^3\text{ gal throughput)} = \frac{(22.4)(5.6)(0.02)}{42}$$

$$= 0.06$$

$$(0.06\ \text{lb/}10^3\ \text{gal})(10{,}000\ \text{bbl})(42\ \text{gal/bbl})(15\ \text{turnovers/yr}) = \underline{0.19\ \text{TPY}}$$

$$\text{Ls} + \text{Lwd} = 3.89 + 0.19$$

$$= \underline{4.06\ \text{TPY}}$$

Good Seals

$$\text{Ls (lb/day)} = (0.608)(0.656)(272)(3.63)(0.045)(1.00)(0.9)(1.0)$$

$$= 15.9$$

$$= \underline{2.90\ \text{TPY}}$$

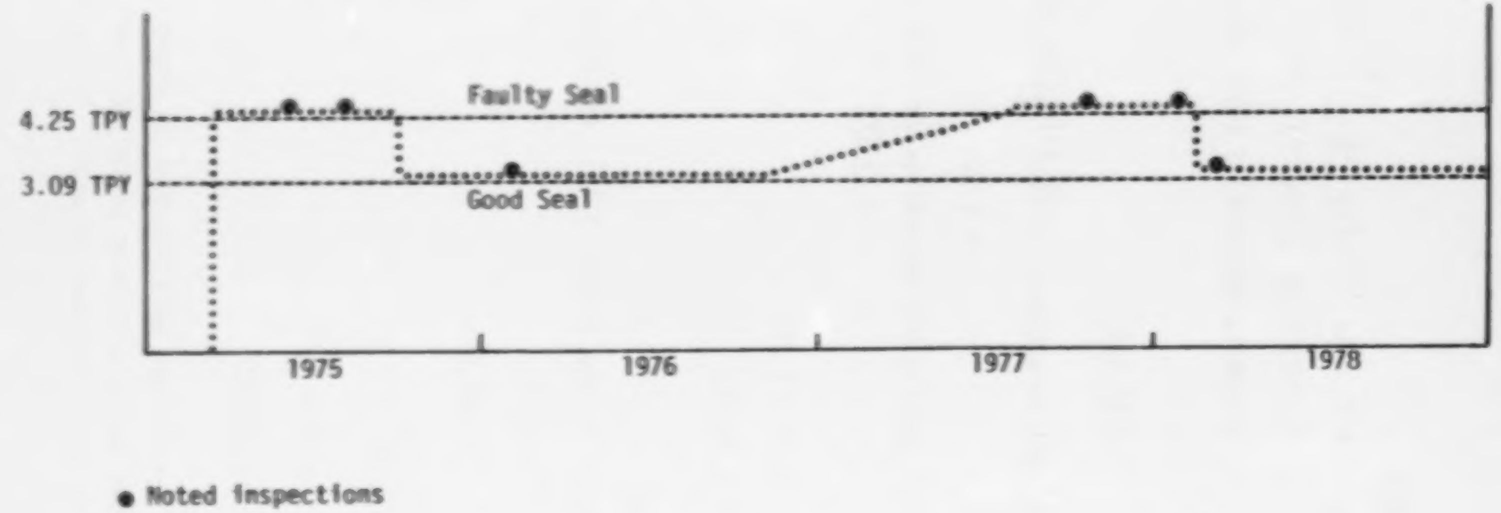
$$\text{Lwd} = \underline{0.19\ \text{TPY}}$$

$$\text{Ls} + \text{Lwd} = 2.90 + 0.19$$

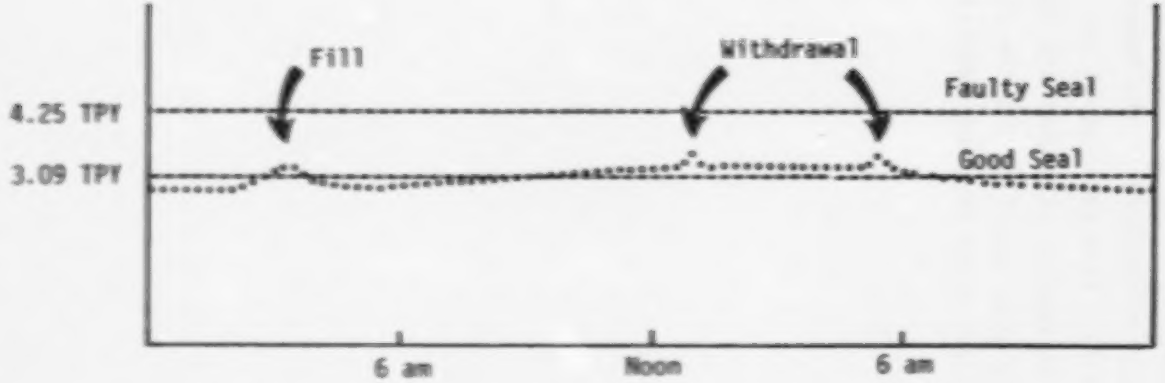
$$= \underline{3.09\ \text{TPY}}$$

The typical day emission profile shows the fluctuations that would occur during a 24 hour period with one fill and two withdrawals to the tank. The average would concure the "good seal" level of 3.09 TPY.

1,000 BBL PONTOON FLOATING ROOF GASOLINE STORAGE TANKS
GOOD AND FAULTY SEALS



1,000 BBL PONTOON FLOATING ROOF GASOLINE STORAGE TANKS
GOOD AND FAULTY SEALS
TYPICAL DAY EMISSION PROFILE



Conclusion

The source is a fuel storage and loading terminal. The primary air pollution problem was a faulty seal on a floating roof tank. The inspection and maintenance of the tanks has been lax. The source has only one full time employee at the facility whose main responsibility is to receive shipments and keep records. Presently, the seals are in good condition and the source is in compliance with the 90 percent vapor recovery regulation.

PETROLEUM PRODUCTS AND HANDLING
Source No. 2

Facility Description

The business is a terminal primarily involved in the receipt, storage, and subsequent distribution of gasoline, with minor handling of diesel and jet fuels. The facility is located on approximately 5 acres bordered by a water front in an industrial area and has been in operation for 55 years. Storage facilities at the terminal consist of six fixed-roof tanks with capacities of 45,000 bbl, 20,000 bbl, two 10,000 bbl, 5,000 bbl, and 3,000 bbl tanks. The facility has a staff of 15 persons, two of which are on the premises for operation of the terminal, and the remainder who are employed as drivers. The operation is open 24 hrs/day, 7 days/wk, however the two working shifts are staggered, hence there is not any loading activity for 2 hours per day.

Key Operations and Pollution Control Equipment

In addition to the storage facilities previously mentioned, major operations are centered around the 12 Anaconda bottom-loading arms which are equipped with a total of four vapor return lines. Since the primary pollution concern is the control of fuel vapors from storage and transfer, the facility installed a Vaporex vapor recovery system compatible with the previously existing vapor system. The Vaporex unit consists of a 50-ton refrigeration unit, a 549 cfm two-stage compressor, a 10,000 gallon underground storage tank for process fluid, and associated piping and couplings. The unit is a pressure activated system, and is on-line when pressures in the vapor system reach a preset level which activates the system until the pressure decays to a preset level.

Decision Making

The control equipment was selected on the basis of low bid, but factors influencing the decision were the proximity of the vendor, and the vendor being a subsidiary of an engineering firm involved in bottom-loading conversion which had a good reputation. Further, the company owning the facility was faced with doing similar work around the country and wanted to have some diversification of installations for comparison of cost and performance. All major expenditures in this company are subject to an Authorization for Expenditure review and approval process. The contract with the vendor was based on performance specifications as opposed to the design specification mechanism. The vendor agreed to and supported the contract until its bankruptcy in late 1976. At that time, the company assigned in-house personnel to correction of performance problems. In late 1977, the company decided the unit should be retired, and contracted with another vendor for construction of a replacement vapor recovery system. This contract was also based on a performance specification mechanism.

Financial Impact

The control system was originally ordered for a 3,000 bbl/hr throughput. The company advised the local APCD that there was a possibility that the delivery rate of the pipeline would increase to 4,500 bbl/hr, hence the APCD advised the company that the control system should have the capacity to cover the increase. The unit was originally costed at approximately $275,000, however, with the modification needed as a result of the increased capacity, an additional cost of $138,000 was incurred for a total unit cost of $413,000. Electrical modifications needed to support the unit amounted to approximately $45,000. At the same time, in response to newly implemented loading rack regulations, loading rack conversions and modifications were included at a cost of $379,000. The total initial cost due to regulations was $837,000. A malfunction in the unit resulted in damage to the facility of $62,000. At the time of start-up, the utility bills jumped approximately 700 percent from $550 per month to $3,400-4,000 per month. Increases in energy costs raised utilities to $4,100 per month during the following year, increasing to a maximum of approximately $5,000 per month. Annual maintenance costs have averaged $30,000-$40,000.

In November 1977, the company ordered a replacement vapor recovery unit from Edwards Engineering for an approximate cost of $218,000. The company has since decided to install internal floating roofs which will exempt tankage from vapor recovery requirements. Due to the requirements of local regulations, the company claims to be limited to one vendor which is expected to increase the projected cost by 40 percent over other vendor prices. This construction is roughly expected to cost $75,000-$100,000.

The capital cost for storage tanks of the same size owned by the source has been estimated by PES to be $615,000. This was calculated using information supplied by a storage tank construction company.

Performance and Problems

Due to extended construction problems, the unit started shake-down operations in summer 1974, and was ready for initial testing in September 1974. The unit encountered reliability and performance problems with modifications continuing until February 1975. The unit was being tested by the APCD, but malfunctioned with the result of built-up pressure rupturing 24 inches of a welded tank seam, thereby invalidating the test. The company let a contract to repair the tank and to seal the tank seams with fiberglass to insure no leakage in early March 1975. These repairs were completed in early April 1975. Vendor personnel started the unit on April 24, 1975 when the compressor failed. The compressor was replaced on May 8, 1975 with additional modifications being made until the unit was started up on May 15, 1975 for a test run. During the test, the main electrical breaker in the control center kicked out necessitating additional modifications. The target date for the start of a reliability run was June 2, 1975, but due to operational problems, the test was delayed until July 24, 1975. The control equipment functioned properly but ran into sporadic problems with the unit down for several hours at a time - enough to show the unit was not reliable. Another series of tests were started on September 27, 1975, however, the unit was not operating properly. Additional modifications were performed with the unit subsequently being tested and passing. In November 1975, a permit to operate was issued for 1 year duration.

The problem with the system, during this time, was not so much collection efficiency as it was reliability. The system was installed contrary to some design specifications, and modifications to parts of the system for the upgrade in capacity were not carried out through the rest of the system. Specifically, a larger capacity compressor was installed, but associated piping and heat exchangers were not changed. A portion of these inconsistencies could be attributed to the fact that the unit was the first built by the vendor.

The unit performed satisfactorily until November 1976 when the compressor broke down due to a malfunction of liquid level controls. The vendor had declared bankruptcy in 1976, hence the company committed its own engineers to the problem. A new compressor was installed on December 28, 1976, ran for 100 hours and broke down. Since the compressor was under warranty, factory representatives examined the installation and clearances during early January 1977. A second compressor was installed on January 16, 1977 and became operational on January 31, 1977. The vapor recovery system encountered operational difficulties and was nonoperational during the the first 8 months of 1977. By October 1977, the unit was again operating satisfactorily, however, the company felt if additional problems were encountered, then a replacement system would be installed. This decision was reached in November 1977 and another system was ordered. The existing system was repaired and kept operational until the new unit was ready. In March 1978, the existing system experienced operational problems from ammonia appearing in the system from an unknown origin. The result was that the chiller coils were corroded necessitating removal of parts and shut down of the system. Repairs were effected by mid-April 1978 and operations commenced until June 9, 1978 at which time the unit was retired and put on standby while the new unit was in a 90-day reliability test run. The new unit has experienced collection problems with the efficiency marginally below the 90 percent reduction needed to meet regulations. The second vendor agreed to and is supporting performance specifications negotiated in the contract and is correcting these problems.

Chronology of Permits and Exceedances

The company notified the APCD of its intent to install a vapor recovery system and submitted applications for an Authority to Construct on March 6, 1973. Information was exchanged between the company and the APCD until early July 1973 at which time an Authority to Construct was issued with conditions unacceptable to the company. Discussions continued until late August 1973 when the company started construction of the unit with reservations about conditions imposed on the Authority to Construct. There was some disagreement as to the performance capabilities of the unit during long periods of operation. The company was on a compliance schedule during this time which was to expire on December 3, 1973, however since equipment was still arriving and being installed, a 6-month extension was granted. Discussions continued regarding the performance capabilities of the system with an agreement to modify the system for 50 percent greater capacity.

At the end of the compliance schedule, the company requested and was granted a variance until the system was operating and subject to performance and reliability tests in fall 1974. Permits to Operate were denied in October and November 1974 by the APCD due to reliability problems. The company again applied for Permits to Operate in February 1975, but ran into performance problems during testing. A variance was applied for and received during March 1975. After additional modifications and performance testing, Permits to Operate were issued in November 1975.

The renewal of Permits to Operate were denied in November 1976 due to performance problems. Additional modifications were performed and the company asked for and was granted a variance in April 1977 to expire in July 1977. Extensions to the variance were granted until June 1978 when the new unit was expected to be operational. The new unit became operational in June 1978 and was undergoing a 90-day reliability test. A Notice of Violation was issued on February 4, 1977 for the operation of storage tanks without a Permit to Operate.

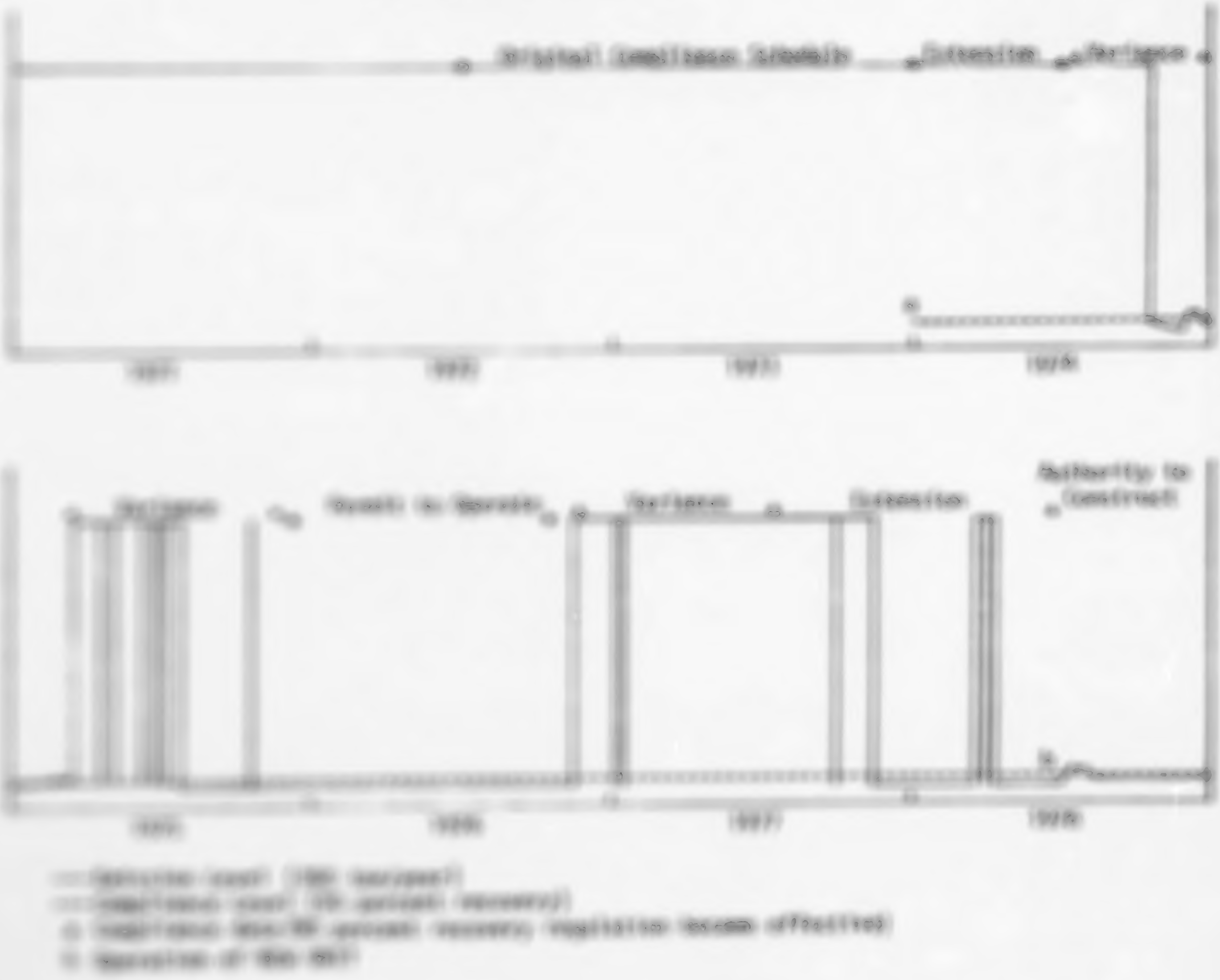
Emissions Profile

The applicable regulations of the APCD call for a 90-percent reduction in hydrocarbon vapors emitted from petroleum terminals during receipt, storage, and distribution of gasoline or similar products. The design of the control system was based on a vapor balance system, hence truck loading could be accomplished without the unit running which was automatically controlled by pressure within the system. The major area of concern was during a pipeline tender, when the unit had to be operational to prevent the emissions of vapors in excess of that allowed by the regulations. Pipeline receipts were normally scheduled approximately once per week, and would release approximately 7 tons of hydrocarbons if the control equipment was not in operation. The annual emissions profile reflects these exceedances as a straight line, however it must be noted that as a condition for variance in March 1978, pipeline tenders were diverted to other terminals in the area depending on their available spare tankage, and product was transported by truck when storage requirements could not be met. The emission levels indicated are for the performance of the vapor recovery unit, but since tenders were diverted to other terminals with vapor collection systems, emissions exceeded the 80 percent recovery levels when the unit broke down in the middle of a receipt until the diversion to other terminals could be accomplished. Worst case emissions, during pipeline receipts prior to the contingency plan, amounted to approximately 350 tons of hydrocarbons per year. The typical day emissions profile shows the system in compliance since truck loading operations were based on the vapor balance aspects of the system.

Conclusions

Several reasons for the failure of the control system to meet performance standards are apparent, 1) proven technology did not exist for vapor recovery at the levels needed to gain compliance, 2) the vendor was not experienced in production of these systems although it was a subsidiary of a firm with good reputation, 3) corresponding design modifications were not followed throughout the system, 4) portions of the design were neglected (safety systems). The company worked on the performance problems with good faith and committed in-house personnel to the problem when the vendor declared bankruptcy. The unit was operating as intended for 1 year before major maintenance problems appeared again. In response to the unreliability of the system, a new device was ordered and installed with minor adjustments needed to correct performance to compliance levels. In the interim, between ordering the new system and its [redacted]ional certification, the company took steps to install additional control techniques which will result in the exemption of the storage tanks from the vapor recovery system.

[illegible]


Original Compliance Schedule
Extension
Variance
Permit to Operate
Variance
Extension
Authority to Construct

[illegible]

PETROLEUM PRODUCTS AND HANDLING
Source No. 3

Facility Description

The source is a gasoline tank farm with a throughput of 35,000,000 gallons per month. The tanks were built between 1962 and 1963. There are both internal and external floating roof tanks at the site. The terminal operates 24 hours per day, 7 days per week. The source dispenses to its own trucks and to two other fuel dispensing companies.

Key Operations and Pollution Control Equipment

The source has 14 gasoline fuel tanks ranging in size from 11,300 to 80,000 bbl. The internal floating roof tanks have only primary seals. The external floating roof tanks have both primary and secondary seals. The primary seal for both types of tanks consists of a bag and shoe arrangement. The bags are filled with foam to better adapt to the shape of the tank walls. The secondary seals of the external floaters are a Maloney type wiper blade.

The tanks are operated in conjunction with: 39 bottom loading arms at five loading racks with 20 vapor recovery arms, and a Parker-Hannifin Model No. V1007 vapor recovery system. The vapor recovery system consists of: 1) an Allis Chalmers 525 CFM rotary compressor; 2) a 33 ton Vilter Chiller (90°F ambient-20 suction); and 3) a 30,000 cubic foot vapor holder.

Decision Making

The major air pollution control decision involved the vapor recovery system. The Parker-Hannifin system was chosen because of the price and the energy efficiency. The technology for vapor recovery was relatively new at the time and the source did not have very solid information about the performance of various systems. As it turned out, the Parker-Hannifin system has a major design defect, i.e., the system does not account for water in the gasoline, therefore, the source must defrost once a day instead of once every 6 months.

Maintenance of the tank farm has a high priority. The tanks are inspected twice a shift or six times per day. If problems are found, the APCD is notified immediately and repairs commence. The source keeps a large supply of spare parts on hand to shorten the downtime.

Of major concern to the source is the possibility that it may have to comply with a pending CARB standard of 95 percent collection efficiency as opposed to the present standard of 90 percent. The source protests that it may have to scrap the entire existing vapor control system to comply with the proposed standard.

Financial Impact

The basic cost of the 14 tanks was $1,064,000. The pollution control equipment was an additional $808,000 which included the five new racks and switching from top to bottom loading arms. In 1977, the source installed aluminum internal floating pans on a couple of the tanks. The basic cost was $31,800, the pollution control cost was $15,700.

The operating and maintenance expense for the pollution control equipment was $34,000 in 1976 and $59,000 in 1977. The abrupt increase in cost was due largely to the replacement of a heat exchanger in 1977.

The source keeps approximately $15,000 worth of spare parts on hand to expedite the repair work. The source maintains that if it is held to a 2 percent downtime limit, it will have to store a dramatically larger amount of spare parts.

Performance and Problems

The Parker-Hannifin unit has had several operational problems mostly revolving around the condenser, the saturator, the turbine pump, and the compressor. The unit's vapor condenser has had recurrent problems with tube failure. In an attempt to rectify the situation, the source has blocked off the factory-installed copper tubes as they fail and replaced them with stainless steel tubes. Due to the time needed for the fabrication and for the attendant expense involved in such a conversion, the progress has been slow resulting in periodic shutdowns of the system. During the periodic shutdowns, the vapors are vented to the atmosphere.

For any downtime of more than 24 hours, the source has had to apply for a variance. For any breakdowns in excess of an hour, the source has had to appear before a member of the hearing board as well as an APCD representative. The source feels this process is too costly and cumbersome and would prefer a more streamlined process.

The saturator pump also has had recurring problems. Since 1974, the source has had to replace this unit three or four times. Beginning in December 1974, 90 days were required to order and replace the unit, only to have it fail subsequently. The source believes the equipment has a faulty design.

The source filed for a variance in April 1977 because of a cooling tube failure. A few days later the petition was retracted because the repairs were already complete. Again, in November 1977, the source petitioned for a variance which was denied because the equipment was repaired before the variance could be considered.

In January 1978, the source petitioned for a variance from a proposed CARB vapor recovery rule specifying 95 percent efficiency. The petition is still pending awaiting interpretation of the rule by the local APCD.

Emission Profiles

The source was placed on a compliance schedule in mid-1972 and eventually granted an extension until February, 1974. (The dashed line indicates the compliance level of 90 percent recovery.) The source was tested in fall of 1974 at the 94.055 percent recovery level. In December, a variance was granted for 90 days to repair the saturated turbine pump.

In 1977, the source experienced a series of breakdowns. Chronologically, the causes for the breakdowns were:

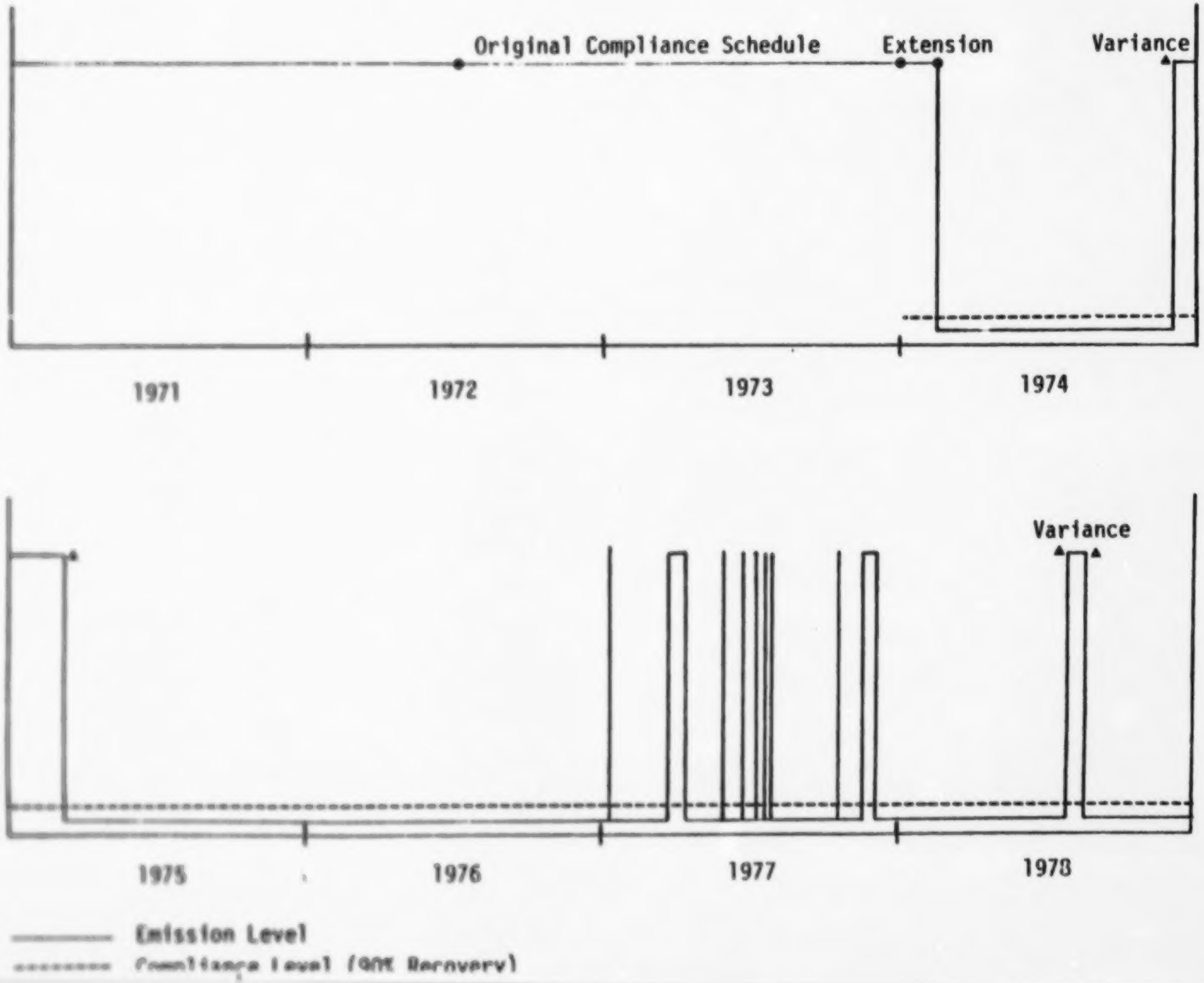
March to April - Condenser tube rupture - 3-1/2 weeks downtime
May - Faulty seal on saturator pump - 2 days
June - 1 inch freon line ruptures - 1 day
July - Freon and vapor compressor failure - 1 day
- Breaker on vapor compressor motor - 1 day
- Pressure switch went out - 1 day
October - Replace compressor blades - 1 day
November to December - Condenser tube replacement - 2 weeks

The source received a 4 week variance in August 1978, to ship the compressor to the factory for a major overhaul. Presently, the source is in compliance.

Conclusion

The source is a gasoline tank farm with 14 tanks ranging in size from 11,300 to 80,000 bbl. The tanks have either external or internal floating roofs. The tanks are operated in conjunction with five loading racks and numerous bottom loading arms and vapor recovery arms. The whole system must comply with the 90 percent vapor recovery level. Under normal operations the source has no problem achieving the compliance level. However, there have been numerous breakdowns. During such times the vapors are vented to the atmosphere.

VAPOR RECOVERY SYSTEM
HYDROCARBON EMISSION RATE



ASPHALT PLANTS
Source No. 1

Facility Description

The source includes a hot mix asphalt batch plant, a cement treated base plant, and a rock crushing and screening operation. The source is located in a rural area on a 400-acre site. Approximately 150 people work at the site. The plant has been in operation since 1921.

Key Operations and Pollution Control Equipment

The Barber-Greene Model 896 Asphalt plant with a 6,000 lb batch capacity is controlled by a Model 9 Cone CB series primary dust collector and a Barber-Greene Model CN-70 wet collector. The cement treated base plant with a Barber-Greene 848 Pugmill and a 100-ton cement storage silo has a baghouse over the silo. The rock crushing and screening plant is controlled by a Johnson-March water spray dust suppression system. The two Joy drills must be operated with damp burlap around the drill holes. Finally, there are two 20,000 gallon underground diesel fuel storage tanks.

Decision Making

The source has been wavering for 8 years on the decision to convert from wet scrubbers to a baghouse for the asphalt plant. The source maintains that the wet scrubbers control the process sufficiently to remain within the compliance level. However, the APCD claims the total emission level, including stack emissions and the fugitive dust, are precariously close to the compliance level. In any case, the APCD is applying pressure to change and the source is resisting.

The APCD requested the source to either hood the conveyor belt in the asphalt plant or use a detergent spray. The source chose the detergent, but covertly uses a mixture of detergent and diesel oil except during the annual source visits. The plant pollution control decisions appear to be based on a mixture of practical experience, cost control, and "what you can get away with."

It is the opinion of the source that the ARB-required annual inspections, at a cost of approximately $575 per year, are unnecessary. This, the source states, can be done away with by the analysis of the district of source production rates and material balance surveys supplied to the district by the source. This, as recently observed, may not be very effective as the adjustment of figures may well prove to be much simpler and less expensive to the district's sources than control equipment operation or installation required by the APCD.

Financial Impact

The company originally experimented with a baghouse as a control on the rock crushing and screening operation. It did not work well, and it was moved to the cement silo in the CTB plant. The cost of the baghouse and its relocation was $21,000.

A Johnson-March spray system replaced the baghouse on the rock crushing and screening operation. The cost for the baghouse was in the range of $8,000 to $16,000.

Presently, the asphalt plant is controlled by wet scrubbers, but the source is considering a baghouse replacement priced at $100,000. The dust emissions from conveyors at the asphalt plant should be controlled exclusively by a detergent spray. The source buys enough detergent to keep up appearances, but uses it sparingly and stores the excess.

Vapor recovery equipment was installed on the two 20,000 gal underground diesel fuel storage tanks which cost $12,000. The system is considered worthless today because of a change in the regulations.

Performance and Problems

Originally, the source sprayed diesel oil on the conveyor belts in the asphalt plant. The oil kept the material from sticking to the belt and suppressed dust. The hot oil emitted blue smoke at the drop point in the conveyor belt. The APCD requested the source to hood and vent the conveyor or switch to a detergent spray. The source opted for the detergent, but soon found that the detergent caused the material to stick to the belt causing delays and increased costs in the operation of the plant. Through experimentation, it was found that a mixture of the diesel oil with the detergent produced good results.

The source feels the APCD is unable to detect the difference since the diesel oil has been added to the detergent. Despite this opinion, the source switches to pure detergent when the district conducts its annual inspections.

The asphalt plant has been tested five times in the last 8 years. Each test has been within the 40 lb/hr compliance level. However, the APCD has decided to alter its method of calculating the results for future tests. Instead of simply testing the stack, the district has decided to add fugitive emissions from leaks in the line to construct a total emission rate. The source may have trouble complying with the new interpretation because of a surge problem while dumping the fines from the primary dust collector.

Chronology of Permits and Exceedances

The source was granted its initial operating permit for the hot mix asphalt plant in 1970. In the spring of 1971, the source received two violation notices for excessive dust, one for the rejects hopper and one for the Telesmith shaker screen.

February 1972, the operating permit for the Joy Drill was granted. In April 1973, an operating permit was granted for the cement treated base plant. Later in September 1973, the operating permit was granted for the rock crushing and screening plant with a Johnson-March Chem Jet dust control.

In the spring of 1976, the source petitioned for a deletion of a permit condition on the asphalt plant requiring "...no leakage of air contaminants to the atmosphere prior to treatment..." by the air pollution control equipment. The hearing board for the APCD denied the petition for variance 2 months later.

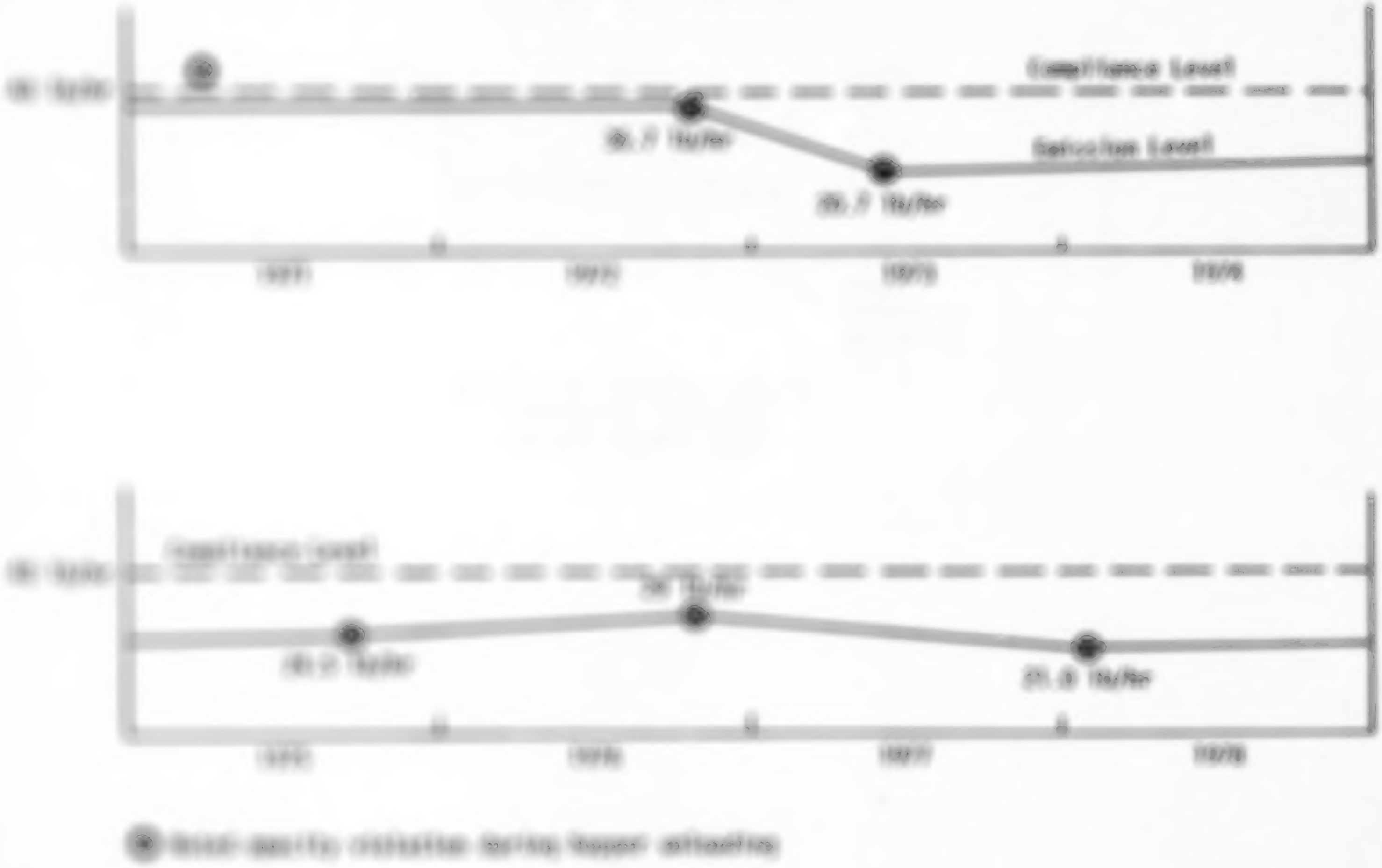
Emission Profiles

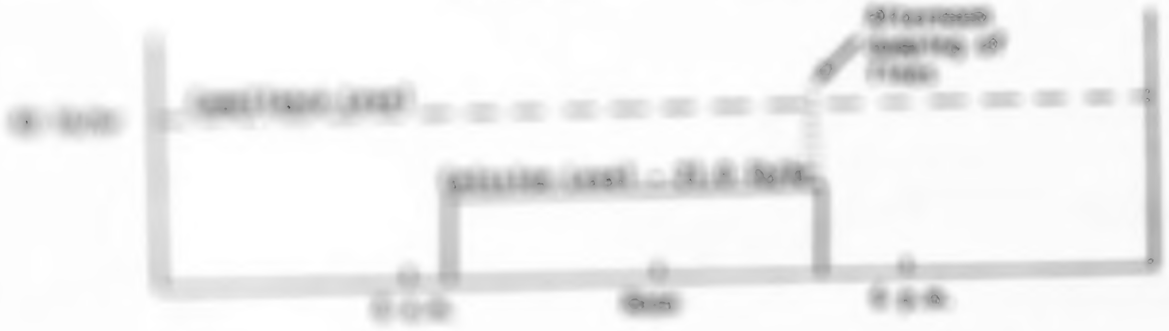
The stack on the asphalt plant has been tested five times in the last 8 years. All five tests have been within the 40 lb/hr compliance level. There was a noted opacity violation in March 1971 for excessive dust from the hot asphalt "rejects" hopper. In actuality, this type of emission is repeated daily either in the afternoon or the morning when the hopper is emptied. The APCD has decided to count all emissions from the process in the 40 lb/hr compliance limit. This would effectively add on to the stack emission level, the emissions via leaks in the lines, and emissions during hopper unloading. Under the new procedure, the asphalt plant may be out of compliance.

Conclusion

The source has three main plants situated on the site; an asphalt plant, a cement batching plant, and a rock and screening plant. The asphalt plant is theprimary air pollution concern. Presently, the 6,000 lb batch capacity plant is controlled by a primary dust collector and a wet scrubber. The APCD is applying pressure to the source to replace th wet scrubber with a baghouse. The APCD has altered its method of testing the total emissions from the asphalt plant. Consequently, the plant may no longer be within the 40 lb/hr compliance level. Te source estimates that it will cost approximately $100,000 for a new baghouse to replace the wet scrubbers.

[illegible] ASPHALT PLANT
PARTICULATE EMISSIONS





ASPHALT PLANTS

Source No. 3

Facility Description

[illegible]

Key Operations and Pollution Control Equipment

[illegible]

[illegible]

[illegible]

[illegible]

in terms of reduced maintenance cost within 4-5 years. In addition, the company would: 1) retain 3 percent of the product normally lost by using the scrubber; and 2) avoid a potential water pollution problem.

The equipment is worn. Yet, the plant runs continually at full capacity. This is accomplished through a diligent maintenance program. This same program has kept the plant with minor exception within the compliance level for 8 years. This indicates a best management approach which has a beneficial spillover effect in area of air pollution control.

Financial Impact

The wet wash scrubber was installed in 1963 at a cost of $110,000. This control will be replaced by a baghouse at the cost of $165-175,000. The operating cost for the new baghouse is expected to be $4-5,000 per year compared to $50,000 for the wet scrubber.

The operational costs are expected to be less for the new baghouse than for the wet wash scrubber for several reasons: 1) no labor cost for cleaning the recycling ponds; 2) less energy demand for the plant; and 3) no breakdowns because of the conveyance of water with abrasive material.

In addition, the baghouse has the advantages of: 1) collecting fines which can be reintroduced into the product; 2) eliminating a 3 percent material loss that was carried away by the water; 3) avoiding a potential groundwater pollution problem; and 4) being easy to modify for plant expansion.

The source estimates the higher initial cost for the baghouse will be offset by the lower production and maintenance cost and the baghouse will pay back the initial cost in 4-5 years.

Performance and Problems

The source has initially had a problem obtaining a permit to operate the cement treated base (CTB) plants. Bag filters on the cement silos had to be installed. Since this time, the company has had no compliance problems with the CTB plants.

The hot mix asphalt plant is controlled by a cyclone dust collector and a wet wash scrubber. The wet wash scrubber is scheduled to be replaced by a baghouse. The only compliance problem with the hot mix asphalt plant involved a smoke violation. This was quickly remedied by changing the oil burned in the drier.

Chronology of Permits and Exceedances

In the fall of 1970, the source was granted permits to operate a hot mix asphalt plant and a mixing plant for soil cement. During the same period, the source was twice denied a Permit to Operate a cement treated base plant beacuse of inadequate control equipment. A baghouse was installed on the cement silo and the Permit to Operate was granted.

In January 1975, a Permit to Operate was granted for a second cement treated base plant including a twin shaft pugmill, cement feeder, 500 barrel cement silo, and a 6 ton weigh hopper. The cement silo, pugmill, and weigh hopper vented to a baghouse.

In January 1977, the source received two Notices of Violation for smoke emission from the hot asphalt plant. The source was brought to court, pleaded *nolo contendere*, and was fined $100. The problem was solved by burning a better quality oil.

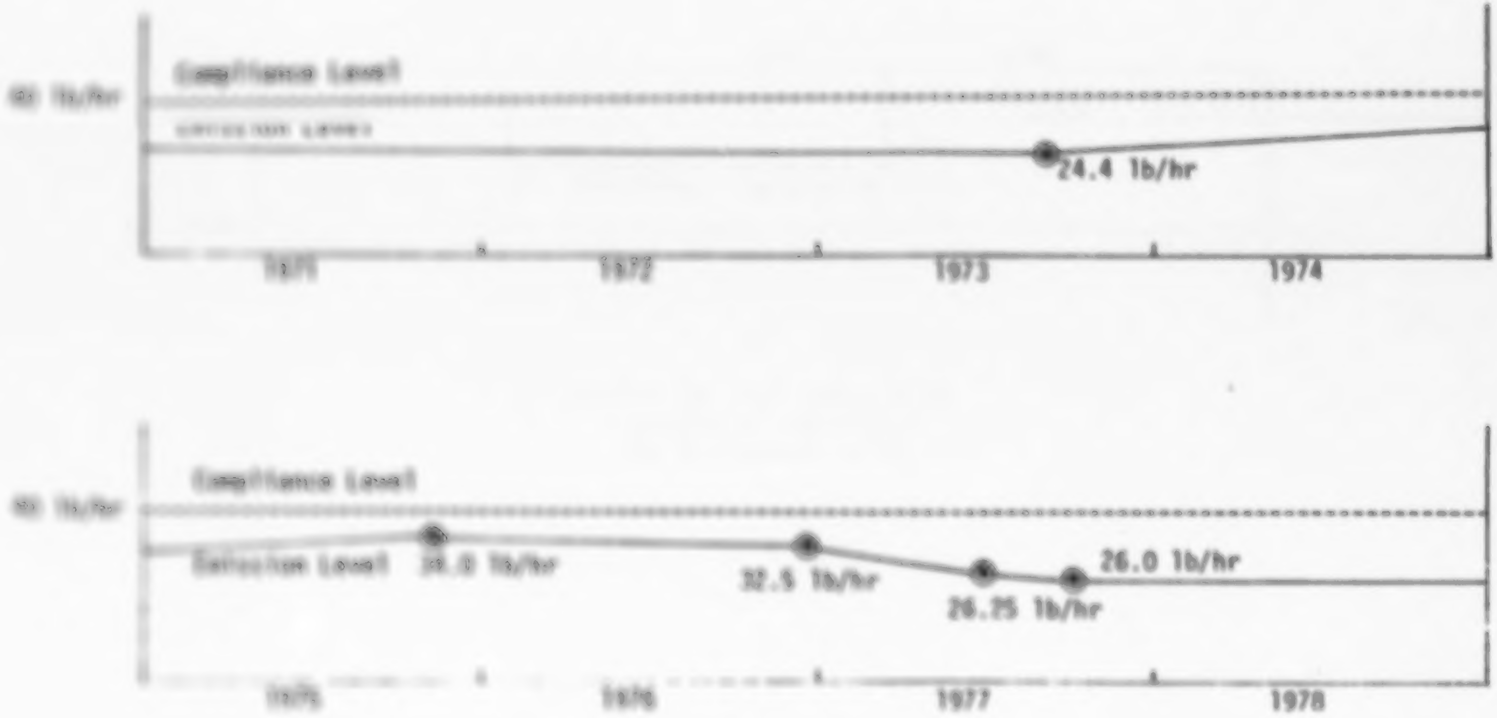
Emission Profiles

The source has been tested five times in the 8 year period. All tests were within the compliance level (40 lb/hr). The source presently operates within compliance.

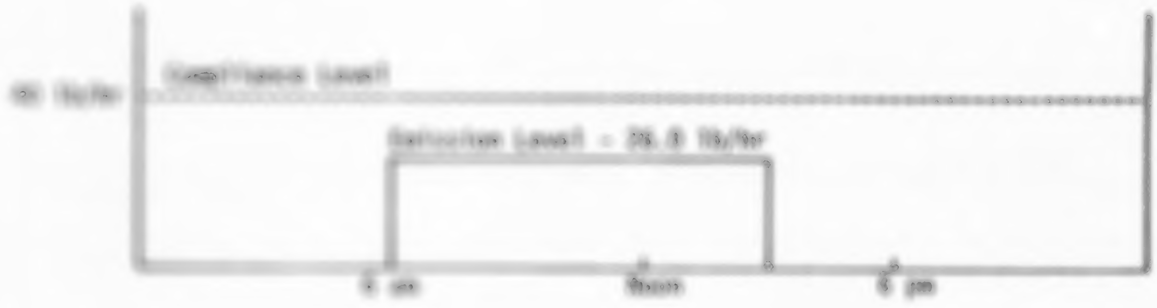
Conclusion

The source has a hot mix asphalt plant and three cement treated base plants. The hot mix asphalt plant is controlled by a cyclone and a wet wash scrubber. The only emission problem with the hot mix asphalt plant involved a smoke violation. This was remedied by upgrading the oil burned in the drier. The wet wash scrubber is scheduled to be replaced by a baghouse. The source expects the baghouse maintenance costs to be much less than those of the scrubber. In fact the baghouse is expected to pay for itself within 4-5 years. In addition, the baghouse should decrease the emission level.

HOT MIX ASPHALT PLANT
PARTICULATE EMISSIONS



HOT MIX ASPHALT PLANT
PARTICULATE EMISSIONS
TYPICAL DAY EMISSION PROFILE



ASPHALT PLANTS
Source No. 3

Facility Description

The source includes a hot mix asphalt batch plant, a rock quarry, and a sand and gravel operation. The site contains 200 acres and is located well outside of the urban perimeter. There are 100 people employed at the site, most of which are truck drivers. The hot mix asphalt plant is automated and operated by three employees. In 1977, 300,000 tons of material were processed which was the source's biggest year. The source has been in operation since the early 1960s. Normal operations are 8 hrs per day and 5-1/2 day per week.

Key Operations and Pollution Control Equipment

The particulate emissions from the hot mix asphalt batch plant are controlled by a size 20 Kisho/Mark II baghouse. The baghouse became operational in June 1976. Previous to this time, the plant used wet scrubbers. The plant monitors the performance of the dryer (indicated by temperature) but does not monitor the particulate emission rate.

Other regulated operations include: 1) a rock crushing and sand screening plant controlled by water spray at the crusher, 2) a cement treated base plant vented to a bag filter, 3) a portable screening plant, 4) a 10,000 gallon underground gasoline storage tank and a vapor recovery system, and 5) a 10,000 gallon underground diesel storage tank and a vapor recovery system.

Decision Making

The key pollution control decision was to replace the particulate wet scrubber with a baghouse rather than another scrubber. The advantages of the baghouse were: 1) the baghouse collects fines which are reintroduced to the mix and improve it, 2) the baghouse is more effective than a scrubber in controlling particulate emissions, 3) there is less maintenance on a baghouse, and 4) the source can avoid the use of ponds. The largest disadvantage of the baghouse is that it was more than twice as expensive as the wet scrubber.

Financial Impact

The new baghouse for the hot mix asphalt batch plant cost $130,000. In addition, the installation of larger motor on the fan (from 175 hp to 300 hp) necessitated the replacement of the plant's entire electrical system which cost $50,000. If the source had opted to replace the wet scrubber with another scrubber, the cost would have been less than half the amount for the baghouse.

The operational costs are difficult to estimate because the source has not been monitoring them. Ostensibly, there is an increased electrical demand because of the larger motor on the fan. Counterbalancing this expense, the fines collected from the baghouse are reintroduced into the process, provide a better asphalt mix, and result in annual savings of $5,000 to the source.

At this point, the maintenance costs for the baghouse have been minimal. The source expects to replace the bags at five-year intervals. The wet scrubbers were more expensive to maintain because of the troubles with the fan and ducting.

Performance and Problems

There has been no problems with the performance of the baghouse control equipment for the hot mix asphalt batch plant. The baghouse has been in operation only 7 months and it is difficult to judge the experience of the plant. The baghouse replaced a wet scrubber which was operating well after 15 years of use.

The wet scrubber had intermittent compliance problems. At times the scrubber could not handle the amount of air being introduced through the drier, hence air would escape out of the drier without going through the scrubber. Because of this problem, the source had trouble receiving its initial permit to operate in 1975 and received a violation notice in 1975.

Chronology of Permits and Exceedances

In December 1975, the source was granted a Permit to Operate for a portable screening plant. At the same time, the source was denied an operating permit for the hot mix asphalt batch plant. The source modified the wet scrubber and received the operating permit early in 1977.

In August 1975, the source was granted an operating permit for a rock crushing and sand screening plant with the provision that the material handled would be kept moist and roads would be watered.

The source received a violation notice in October 1976 for fugitive dust emissions from the hot mix asphalt batch plant. The source made the necessary adjustments to the wet scrubber. No further action was taken.

In February 1980, the source was granted an operating permit for a cement treated base plant with cement silo vented to a bag house.

Emission Profile

The source is a [illegible] ton per hour hot mix asphalt batch plant. The allowable particulate emissions is [illegible]. The emissions for this plant are [illegible]. Compilation of Air Pollutant Emission Factors, [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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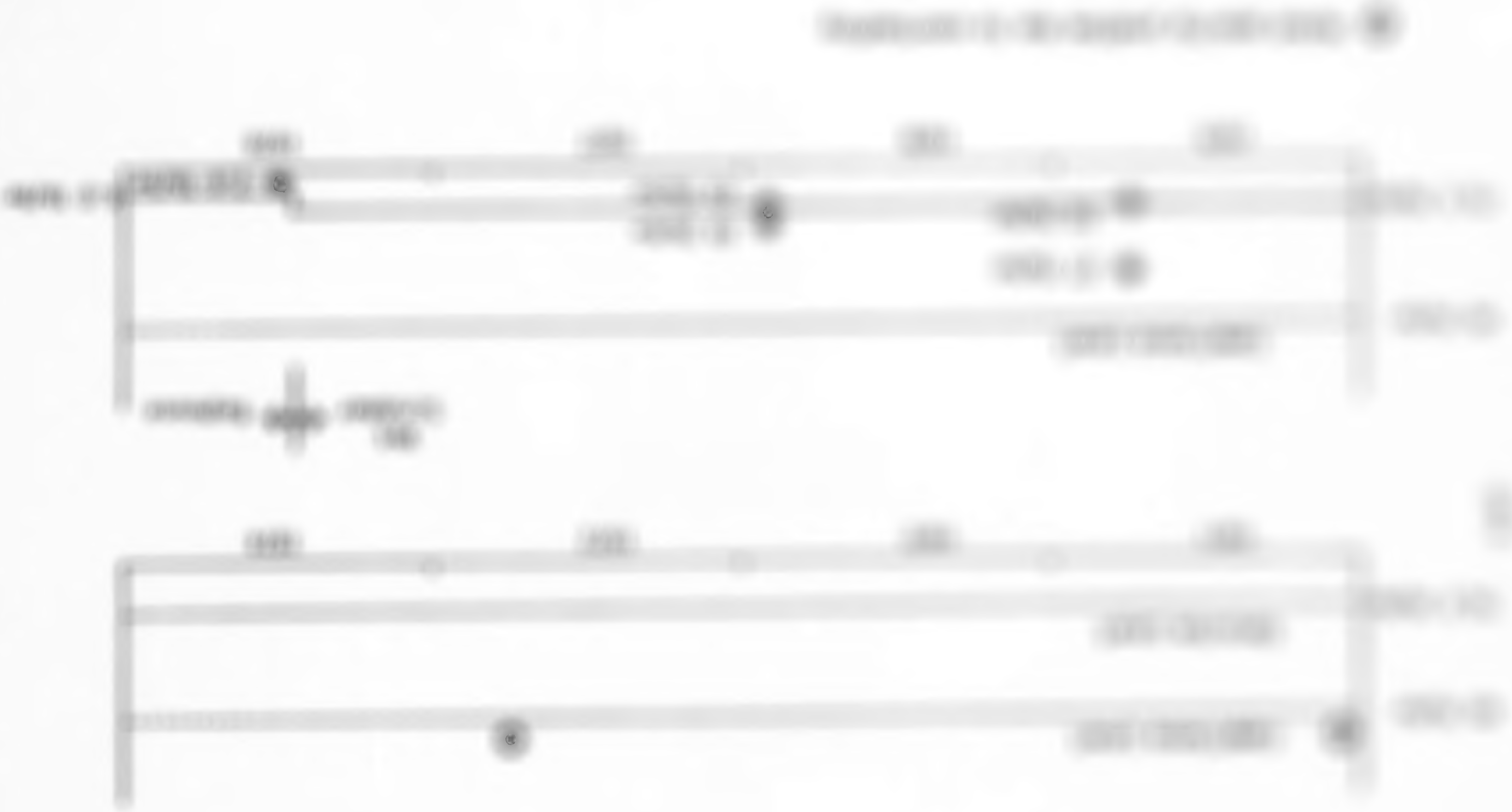

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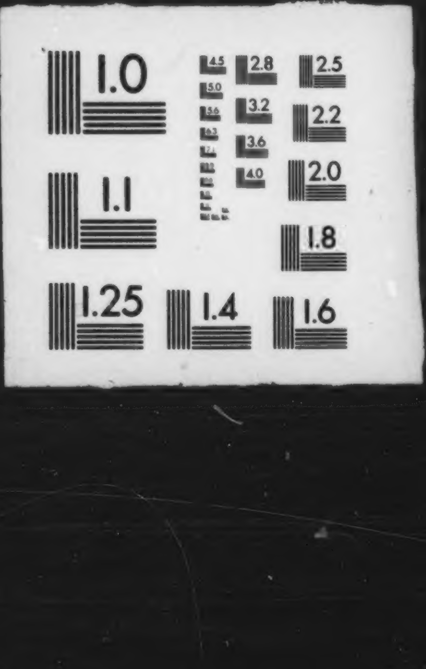
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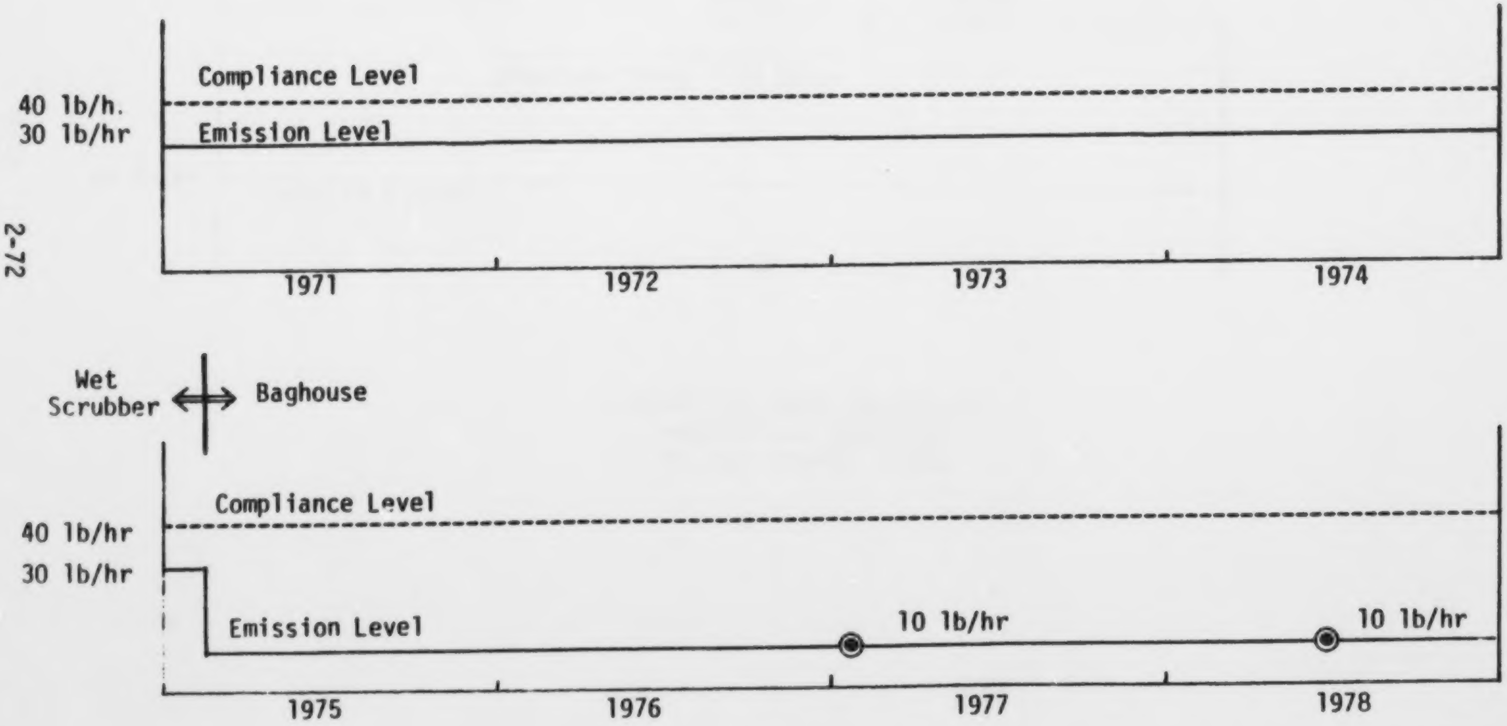
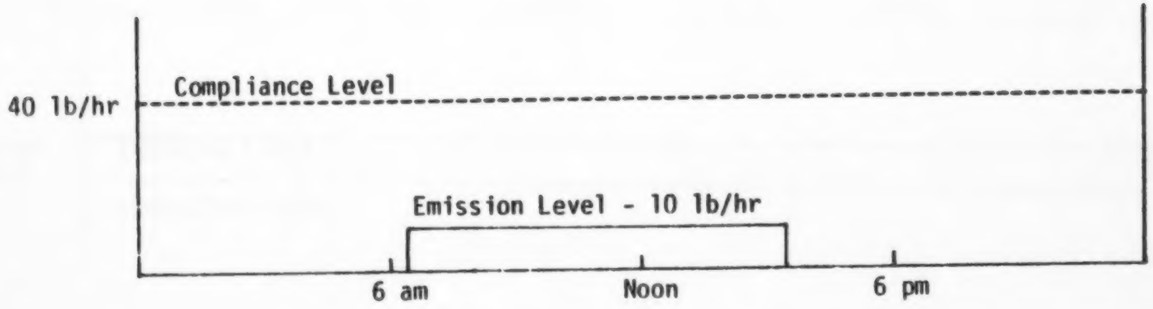
HOT MIX ASPHALT PLANT
PARTICULATE EMISSIONS



HOT MIX ASPHALT PLANT
PARTICULATE EMISSIONS
TYPICAL DAY EMISSION PROFILE



IRON AND STEEL PLANTS
Source No. 1

Facility Description

The source is a shipbuilder. They build three to four ships a year and range from 35,000 to 150,000 dead weight tons. In 1977, the source did $250 million worth of business. The source is located on a 147-acre, water-fronted site. Six thousand people are employed at the site. Normal working hours are from 7:00 a.m. to 11:30 p.m., 5 days per week.

Key Operations and Pollution Control Equipment

This business is a large shipbuilding operation. A partial list of regulated equipment follows:

1) Two Cupola furnaces with afterburners and shared effluent cooling chamber-baghouse system
2) Five boilers
3) Blasting equipment including 40 nozzles and 59 pots
4) Hot dip galvanizing equipment
5) Melting pit type crucible furnace
6) Blast house with baghouse

The primary pollution problems center around three operations: 1) blasting in the yard, 2) painting in the yard, and 3) testing and calibrating newly installed propulsion equipment on ships under construction. The blasting and painting operations are controlled by coordinating operations with wind conditions. Also the blasting operation has a specified grit and the painting operation uses a specified paint. The testing and calibrating of broilers on new ships was granted a variance by state law.

Decision Making

Selection of the air pollution control strategy was an executive decision combined with pressure from the APCD. For instance, the source wanted to install an experimental wet scrubber on the foundry but was restricted to a baghouse by the APCD.

The performance by the workers of some of the control operations in the yard is lax at best and perhaps ignored. It is hard to pin point the source of neglect, i.e. did the yard workers fail to carry out clear guidelines or were guidelines ever instituted? The particular point of question concerns the particulate emissions during the testing and calibrating of new boilers. The source is on record stating, during any testing, there will be: 1) an observer stationed outside the ship with a communications system monitoring the emissions, and 2) a periscope from the operations room to monitor the stack. However, during at least one test, the periscope was turned in the wrong direction, the observer did not have a communications system, and he could not see the stack from where he was stationed.

Financial Impact

The source stated they did not have categorical breakdowns for the expense of pollution control, i.e., maintenance costs were not segregated into cost for maintaining the baghouse as opposed to maintaining the cupola. The source failed to recognize some of the control measures as warranted for their situation. Other control measures were so well integrated into the work place, they were considered best management practices. The costs that were enumerated as meddlesome to the company affairs were: 1) a baghouse replacement for the foundry projected to cost $125,000 rather than a cheaper wet scrubber, 2) maintenance cost on the present baghouse because it required servicing virtually every time it was used,

3) the sandblasting grit required by the Air Resources Board was more expensive and was distributed by less reliable suppliers, and 4) the APCD's permit fees and source testing which amounted to $3,500.

The source executives maintained that air pollution control had cost them dearly, but they were unable to quantify that cost. They presented a combined cost for Safety and Environmental affairs which amounted to approximately 20 percent of a $4.4 million total capital budget, but declined to resolve the division between safety and environmental.

Performance and Problems

The most problematic operation at the shipyard concerns testing and calibrating new boilers on ships under construction. Excessive emission occurs when there is an improper mixture of air and fuel in the boiler burners. This can occur during any of the several steps in the calibration and testing procedure. The tests are necessary to insure that the ship is in condition to put to sea for sea trials. The design of these boilers is such that they will operate within the applicable APCD regulations in normal operation after calibration of the equipment and associated control systems.

The Environmental Review Board found that the boiler testing and calibration would have no significant effect on the environment. The San Diego APCD concurred with the finding of the Board, but was bound by the air pollution rules and regulations to cite violators of the visible emissions rule. Furthermore, the source had committed itself to perfect and institute control measures to comply with the emissions rule (technology forcing), but did not or could not fulfill the commitment.

Finally, a cyclic series of events emerged: (1) a new boiler would be tested, (2) the APCD would cite the source for violation of the visible emissions rule, (3) the source would apply for and receive a variance for a set time which would include perfecting control measures, and (4) the variance would lapse and a new boiler would be tested. The State legislature finally intervened, exempted ships from the visible emission regulations, and established new regulations for ships.

Chronology of Exceedances

The source received a notice of violation in May 1973 for smoke emissions from the stack serving the burners under the galvanized tank.

In the summer of 1973, the source received three notices of violation for black smoke emissions from the boiler stack of a new ship under construction. A criminal complaint was filed against the source. The source pleaded guilty and paid a $900 fine. In July 1974, the source received another notice of violation for smoke emission while testing a new ship boiler. The APCD requested criminal charges brought against the source a few days later. The source petitioned for a variance which was granted for 6 months until the end of March 1975. The variance was later extended until June 1975. Then in September 1976, the APCD again filed a criminal complaint against the source for violating the visible emissions standard while firing up a new boiler fire box on a ship under construction. The source again petition for a variance which was granted until December 1977. Finally, in September, 1978, the California State Legislature passed a law (SB2198) which allowed ship boilers to discharge up to Ringleman three-level for 15 minutes per hour and up to Ringleman three, all hour for emergency operations.

Emission Profiles

During the final phase of construction, the source tests the boiler on the ship. One of the tests involves unbalancing the air/fuel ratio and then bringing the ratio back into balance. During these tests, the boiler may emit dark smoke from the stack.

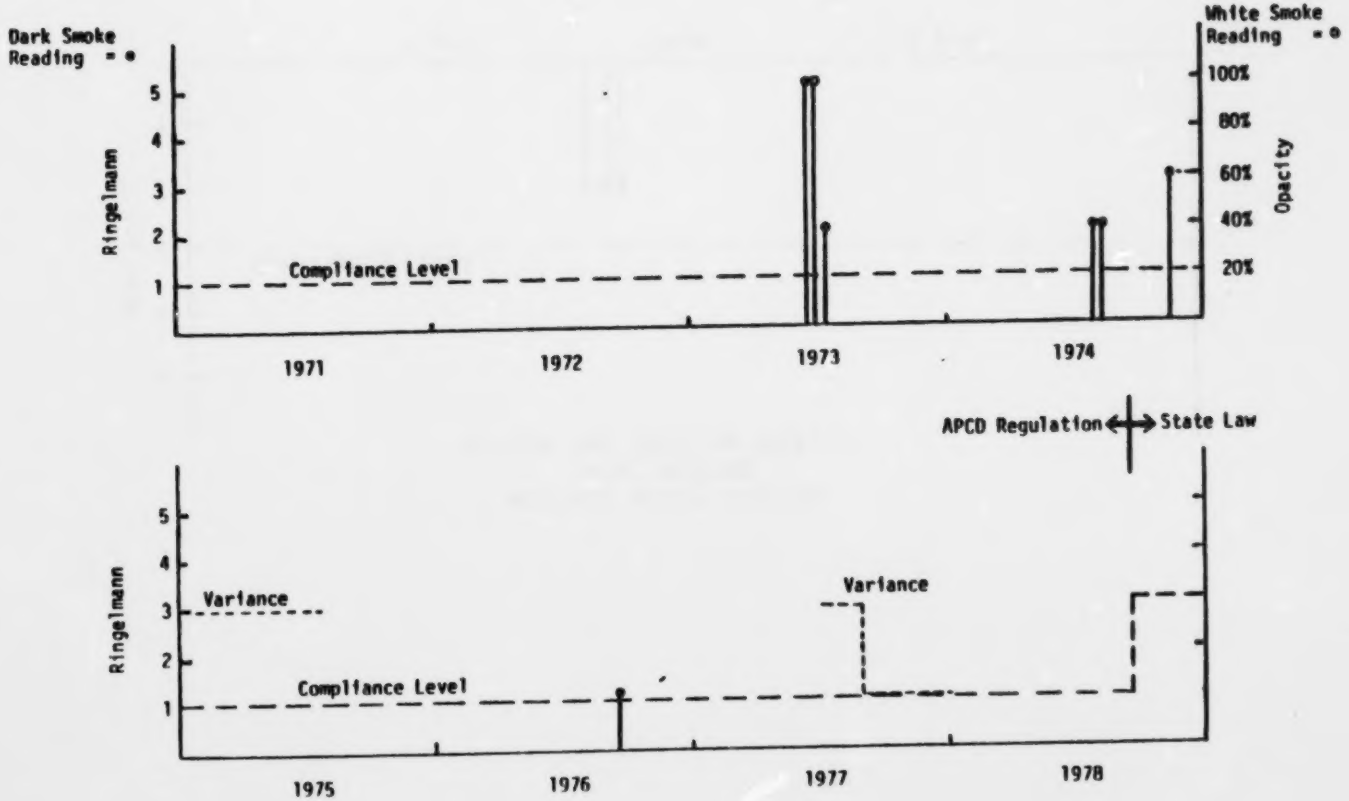
The APCD Rule 50 prohibits discharge of emissions darker than Ringelmann 1 for more than 3 minutes in any one hour. The source violated this standard in 1973, and again in 1974, while testing new ships. The source was granted a variance from Rule 50 in late 1974 until July 1975 to continue testing new ship boilers. The variance allowed emissions to Ringelmann 3 for 10 min/hr, but no more than 36 minutes in any 12 consecutive hours. The variance lapsed and the source received another violation notice in September 1976. The source again petitioned for a variance. This second variance was set sequentially for three ships being tested. The first boiler was allowed up to Ringelmann 3 for 10 min/hr for 12 hours. The second boiler was allowed up to Ringelman 1 for 10 min/hr for 5 hours. The third was allowed Ringelmann 1 for 6 min/hr for 10 hours during 6 days of testing. Finally, the California State Legislation passed a law (SB2198) which became effective in September 1978 granting a variance to all ship boilers allowing emissions up to Ringelmann 3 for 15 min/hr and up to Ringelmann 3, all hour for emergency operations. The source has had no further violation problems.

The typical day emissions profile is for a testing day which may occur 9 to 12 times a year.

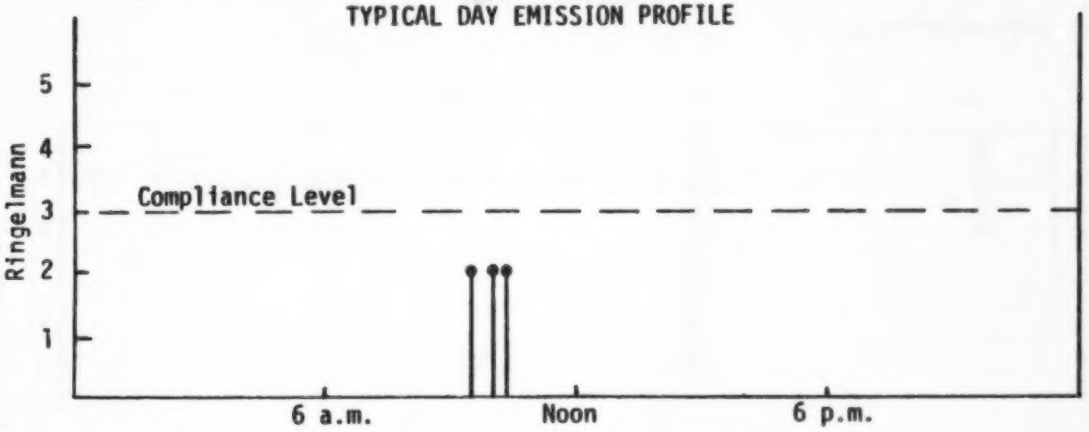
Conclusion

The source builds three or four large ships a year. The primary pollution problem centers around testing and calibrating newly installed propulsion equipment on ships under construction. The

NEW SHIP BOILER TESTING
SMOKE READING



NEW SHIP BOILER TESTING
SMOKE READING
TYPICAL DAY EMISSION PROFILE



source received a series of violation notices for exceeding opacity standards whenever they tested a new type of boiler. The source received several variances on the condition they perfect the testing process so as not to exceed the standard. The source never perfected the process. Ultimately, a state law was passed which superseded the APCD rule on opacity for ships and raised the allowable standard. Since the law was passed, the source has had no further compliance problems.

ALUMINUM PLANTS
Source No.1

Facility Description

The company is an aluminum and magnesium alloy sand casting facility located in a light industrial park. The company has been in business 7 years and moved from a rural area to this location 3 years ago. There are 12 employees in the foundry which operates 8 hrs/day; 5 days/week, and 52 weeks/year.

Key Operations and Pollution Control Equipment

The foundry operation consists of five gas-fired refractory lined crucible furnaces for melting aluminum. There are two 600-pound, one 400-pound, one 300-pound, and one 250-pound capacity furnaces. The facility is also equipped with two 400-pound casting sand mixers and three Jolt Squeeze mold forming machines. A gas-fired oven is used for mold core drying. There is no active pollution control equipment on the premises.

Decision Making

Because of the size of the company, all decisions are made by the president of the company. Since the operation is a small one, it was decided that pollution control efforts would be confined to variable parameters in the production process whenever possible. This approach was followed by changing the composition of the sand, and in an inert gas blanket system.

Financial Impact

Different sand compositions and an inert gas blanket system to correct odor emissions from the operation cost $22,000. After these efforts failed and the APCD advised it would seek a cease and desist order if odors continued, the company determined that adequate control equipment would cost an additional $50,000, or it would have to move. When the cost of control and inherent safety problems were compared with the company's pricing of parts and castings, it was decided that the operation would be marginal and it was phased out. The decision cancelled 75 percent of the company's backlog. The foundry has $100,000 worth of equipment, with normal maintenance costing $12,000 - $15,000 per year. Yearly maintenance costs were expected to double with the proposed control equipment.

Performance and Problems

Odor had always been a problem when the company was casting magnesium alloys. There were no complaints until the company moved into a light industrial park. There were no real complaints until spring 1977 when production levels increased. The company responded by trying various compositions of casting sand and applying more exacting control to the process. Several of the sand compositions reacted adversely with the metallic fluxes used in the process and odors increased. The APCD responded to the renewed complaints, and the company proposed an inert gas blanket of CO_2 although it had been tried before but was abandoned due to excessive costs. The gas blanket worked to some degree but was considered a safety hazard. In addition, flux changes created excessive SO_2 emissions from castings which vented into the shop environment. The company then decided that additional pollution control costs were excessive and the process was abandoned.

Chronology of Permits and Exceedances

The company is exempt from process regulation due to its size. The APCD has jurisdiction due to nuisance, visible, and flourine regulations. In early 1978, the company was cited for odors. The company met with the APCD on May 11, 1978 to discuss what could be done to alleviate the odor problems, and the APCD agreed to a program. The company received a Notice of Violation on July 28, 1978 for flourine emissions, and another Notice of Violation on August 28, 1978 for excessive visible emissions. On August 21, 1978, the company applied for and was granted a 2-month variance due to late arrival of equipment and subsequently delayed installation. Due to safety hazards and the need for additional pollution control equipment, the process was abandoned.

Emissions Profile

An emissions profile was not included because odor emissions are not quantifiable. This case was included to illustrate the adverse impact on operations that pollution control measures can effect.

Conclusions

After apparent efforts, in good faith to control odor from its operations, the company decided that the additional pollution control costs were excessive. Since the APCD advised the company that it would ask for a cease and desist order if odor continued unabated, the company abandoned the process. The decision cancelled 75 percent of the company's backlogged business, and it had to slow down its operations.

ALUMINUM PLANTS
Source No. 2

Facility Description

The source is a purchaser and seller of scrap metal. The volume of business has fluctuated in the last few years from a low of $9,000,000 in 1977 to a high of $17,000,000 in 1978. The business was established in 1956, on two sites, six blocks apart. One site is 4.25 acres, water-fronted, and contains a ship bulk iron loading operation. The other is four acres in an industrial area. The source employs 75 people and operates from 8 a.m. to 4:30 p.m., 5 days per week.

Key Operations and Pollution Control Equipment

The source has four primary operations: 1) an aluminum sweat furnace with a multiple chamber incinerator; 2) an automobile shedder which includes a 10,000 HP hammermill, four cyclone separators, and a water spray to cool the hammermill; 3) a reclamation plant including a metal reclaimer, loader hopper, two screen shakers, a cyclone separator, and a rotating water wash screen drum; and 4) a ship bulk scrap iron loading system consisting of a belt conveyor, a shaker-spreader, a cyclone separator, and a pipe spray system at the top of the belt.

Decision Making

The source is of the firm opinion that they are not a serious air polluter. The basis of this opinion rests on the fact that their equipment generally operates only a few hours every month. The bulk ship loading occurs when a ship is at the dock. There are normally 10 ships loaded per year. Each vessel loads for 3 days, 16 hours per day. The sweat furnace is operational 5 to 7 days per month.) This opinion has strongly influenced the source's response to air pollution regulation. Basically, the source has deferred action on installing pollution control equipment. In addition, the source has often deleted the use of the modest control measures they do have.

The source is presently on a court ordered compliance schedule which they are taking seriously. Also, the source has shifted the responsibility for air pollution concerns from the compnay owner to a Corporate Counsel. These actions have improved the working relationship between the source and the APCD which had notably declined over the last few years.

Financial Impact

Air pollution control cost the source very little between 1970 and 1977 because they did not install any equipment. The source received a court ordered compliance schedule in March 1977. The source hired a consultant for $9,000 to design a control process guaranteed to bring all of the equipment into compliance. The total cost was set at $800,000 with installation. Of this total, $200,000 is to correct the fugitive dust problem at the ship bulk loading operation and $600,000 for the control equipment for the sweat furnace, shredder, and separator. The source maintains this will increase the end product cost by 50¢ per ton for the next 20 years as the debt is repaid. Current price for scrap iron is $110 per ton.

The source explained that 1977 was a bad year for them, with a 45 percent reduction of their business. The source felt it would take up to 2 years to cover their losses from that year. Correspondingly, the imposition of a large financial burden for pollution control was untimely at best. The source maintained that they had a great deal of trouble securing a loan for the control equipment.

Performance and Problems

The aluminum sweat furnace has had a couple of noted problems. First, the aluminum slag would burst into flame when exposed to air. Second, the stack would emit particulates in excess of the 0.1 gr/dscf standard. Solutions were agreed upon by both the source and the APCD in late 1973. The slag would be retained at the back of the furnace until the temperature dropped below the ignition point. A venturi scrubber would be installed to reduce the emissions from the stack. The source instituted the practice of leaving the slag in the furnace, but did not install the venturi scrubber as promised. Presently, the source is under a court ordered compliance schedule. The source is installing a baghouse and a cyclone to control the emissions from the furnace.

The automobile shedder has a fugitive dust problem. The source is in the process of installing hoods and vents to a venturi scrubber to remedy the situation.

At the ship loading site, the source has a fugitive dust problem from the conveyor which transports the scrap iron from the dock to the ship hole. The source installed a water spray system on the conveyor belt, but found the amount of water passed into the ship to be unacceptable. Consequently, they discontinued the use of the spray. Presently, the source is under a compliance schedule to install a baghouse and an additional shaker.

Chronology of Permits and Exceedances

The source received 20 violation notices between 1971 and 1977 which are summarized as follows:

SOURCE NOTICES OF VIOLATION BETWEEN 1971 AND 1977

Date	Violation	Equipment	Disposition	
4/21/71	Visible Emissions	Open burning of scrap	Office Hearing	
11/23/71	Visible Emissions	Open burning of slag	Office Hearing	
2/ 2/72	Visible Emissions	Open burning of scrap	Office Hearing	
3/13/72	Visible Emissions	Open burning of fabric	Office Hearing	
5/31/73	Incinerator Burning	Burning in single chamber incinerator	Court Case	$50 Fine
5/31/73	Visible Emissions	Open burning	Court Case	
10/ 1/74	Visible Emissions	Open burning of refuse		
11/ 8/74	Visible Emissions	Al. Sweat Furnace		
6/10/75	Visible Emissions	Al. Sweat Furnace	Court Case - $150 Fine	
1/29/76	Visible Emissions	Al. Sweat Furnace	Court Case - $50 Fine	
7/19/76	Visible Emissions	Scrap Metal Ship Loader	Court Case - Charge Dropped	
9/ 7/76	Visible Emissions	Scrap Metal Ship Loader	Court Case - Charge Dropped	
12/ 2/76	Visible Emissions	Scrap Metal Ship Loader	Court Case	$750 Fine 3-Year Probation
12/20/76	Visible Emissions	Scrap Metal Ship Loader	Court Case	
12/21/76	Visible Emissions	Scrap Metal Ship Loader	Court Case	
5/13/77	Dust and Fumes	Al. Sweat Furnace	Furnace Allegedly Repaired	
6/29/77	Visible Emissions	Al. Sweat Furnace	Furnace Allegedly Repaired	
8//6/77	Visible Emissions	Al. Sweat Furnace	Furnace Allegedly Repaired	
11/15/77	Visible Emissions	Al. Sweat Furnace	Compliance Schedule	
11/16/77	Visible Emissions	Al. Sweat Furnace	Compliance Schedule	

In early 1972, operating permits were granted for the automobile shedder and the wire reclamation process. The operating permit for the sweat furnace was held up until the source altered its process of removing aluminum slag before it cooled. The slag would burn and cause smoke violations.

In the fall of 1973, the APCD required the source to submit a compliance schedule to meet the new compliance levels for the scrap shedder and the reclamation incinerator. The source submitted a compliance schedule, but did not make the alterations.

In July 1975, an operating permit was granted for the scrap metal ship loader. The loader had been operating since 1973.

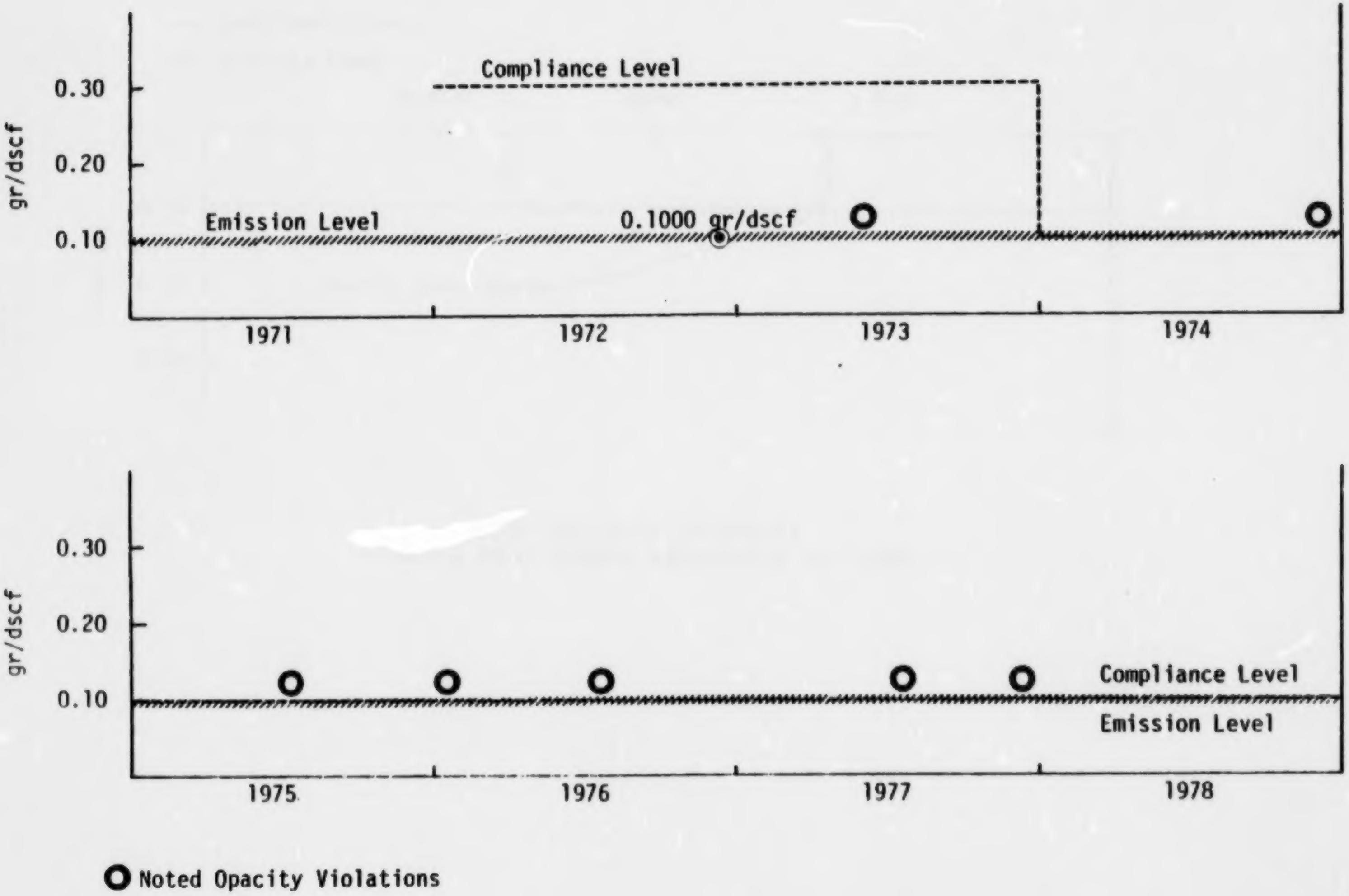
In October 1976, the APCD discovered that the source was not following the compliance schedule from 1974 for the scrap shedder and reclamation incinerator.

Early in 1978, the APCD requested an abatement order for the scrap metal ship loader, a $120,000 fine for operating the loader without attendant water spray (permit condition), and a $10,500 fine for 14 violations received in 1977-78 for the scrap metal ship loader. The court placed the source on a compliance schedule.

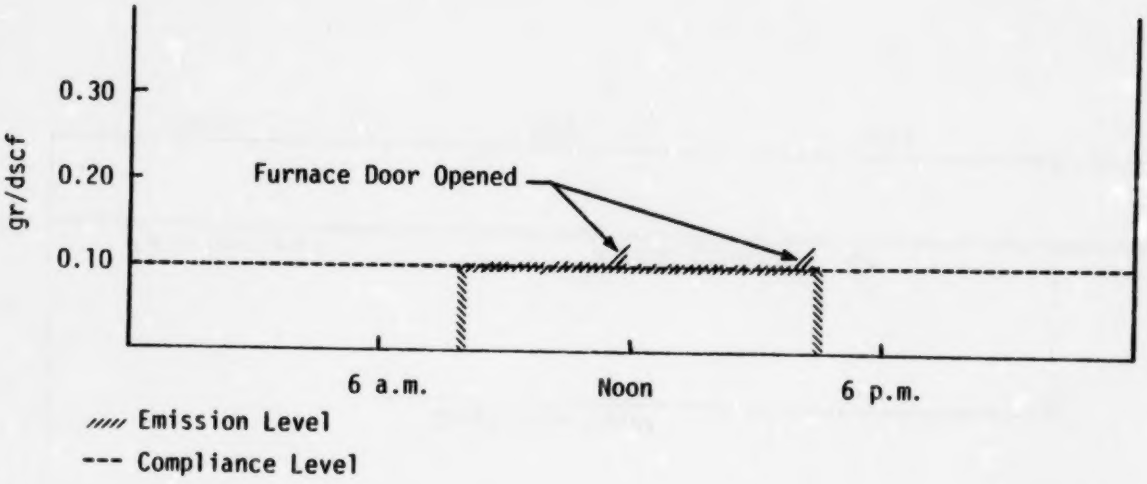
Emission Profiles

The compliance level for particulate emissions from the aluminum sweat furnace was dropped from 0.300 gr/dscf to 0.100 gr/dscf in January 1974. The furnace emitted particulates at the 0.100 gr/dscf level. However, violations were received for visible emissions during this same time. The typical day profile illustrates part of the problem, i.e., when the door of the furnace is opened twice daily, excess emissions escape. The source is presently on a compliance schedule which specifies a cyclone and baghouse for the furnace and hooding for the door.

ALUMINUM SWEAT FURNACE PARTICULATE EMISSIONS



ALUMINUM SWEAT FURNACE PARTICULATE EMISSIONS
TYPICAL DAY EMISSION PROFILE



Conclusion

Both the source and the APCD have been caught in a quagmire of decisions which have evolved away from the underlying goal of environmental quality. The source operates several processes (an aluminum sweat furnace, an automobile shedder, and a scrap metal ship loading process) which have a minimally adverse environmental impact. The APCD began regulating the source and requested a compliance schedule. The source returned control plans, but did not initiate the adjustments to their processes. The source firmly believed that since their equipment was in operation only a few days per month that expensive control equipment was unwarranted. Consequently, the source ignored its commitments to the APCD. The APCD eventually responded with a complaint which called for abatement and large fines. Finally, the Superior Court settled the situation denying the abatement order and large fines, but instituting a compliance schedule.

MINERAL PROCESSING PLANTS
Source No. 1

Facility Description

The business of this source is perlite processing. The source can process 1.5 tons of perlite per hour. The present 3 acre location has been in production for 22 years. This site is on the outskirts of the urban area in a moderate industrial district. There are 11 employees.

Key Operations and Pollution Control Equipment

The primary air pollution concern is perlite dust venting or escaping from the process. There are two perlite processing lines. Each has in series a vertical expanding furnace, a primary cyclone separator, a secondary cyclone collector, and a Mikro-Pulsaire baghouse with 100 8 foot Nomex bags. Both lines share a receiving system which includes a hopper, a screw conveyor, and a bucket elevator.

Decision Making

This source has undergone a gradual shift in attitude toward air pollution control during the last 8 years. Part of the shift can be accounted to the changeover in management from father to sons. Another part can be attributed to the diligent surveillance by the APCD. In any case, the source has become more conscious of their emission problem. Correspondingly, the response time has been reduced from a day to an hour to correct leaks or faulty unloading procedures.

Financial Impact

The perlite line, which originally cost $310,000, was enclosed to prevent dust emissions. The abrasive quality of perlite required the installation of a durable stainless steel ducting system at the cost of $23-30,000 for each of the two lines. The baghouses for each line cost $45-53,000 apiece. The maintenance on the ducting and baghouses amounts to $40,000 per year for both systems. Again this is inflated because of the abrasive quality of the material being handled.

The source attributes these expenses solely to air pollution control. Yet, it is reasonable to assume the source would have had to install similar equipment to comply with OSHA standards for worker health protection. In addition, the material collected is sellable product and some percentage of the cost of control is reclaimed.

In the late 1960's, the source also operated a DDT production line. This was a marginally profitable operation which was shut down by the source rather than replace a worn out scrubber with a baghouse.

Performance and Problems

The source was licensed to operate in 1970 with the dust collector. From 1970 until 1973, the source operated with few problems more serious than a minor intermittent plume. In 1973, the source and the APCD agreed that a more sophisticated baghouse would be installed. Since this time, emissions problems have been confined to occasional leaks in the line or to faulty truck unloading procedure. The leaks in the line are due partially to the abrasive quality of perlite. Degradation in perlite lines is a common problem which requires continual surveillance.

Chronology of Permits and Exceedances

In May 1970, the source received the initial Permit to Operate the perlite processing lines with dust collectors. Two Notices of Violation for excessive dust emissions were issued to the source within the next 2 years. The source responded by installing cyclones and bag filters in June 1973. In the following 6 months the source received three more notices of violation for dust emissions. The source was brought to court on a criminal complaint in January 1974. The source pleaded guilty, paid a $200 fine, and promised to install proper control equipment. Probation was extended for 2 years. Within this 2 year probation, the source received two more Notices of Violation, again for dust emissions. A criminal complaint was drawn up in November 1976. The court ruled against the source in February 1977, and imposed another 2 year probation period. The APCD issued new operating conditions for the perlite lines in March 1977. Since this time, one Notice of Violation was received for faulty truck unloading procedure resulting in excessive dust, but no further action was taken against the source.

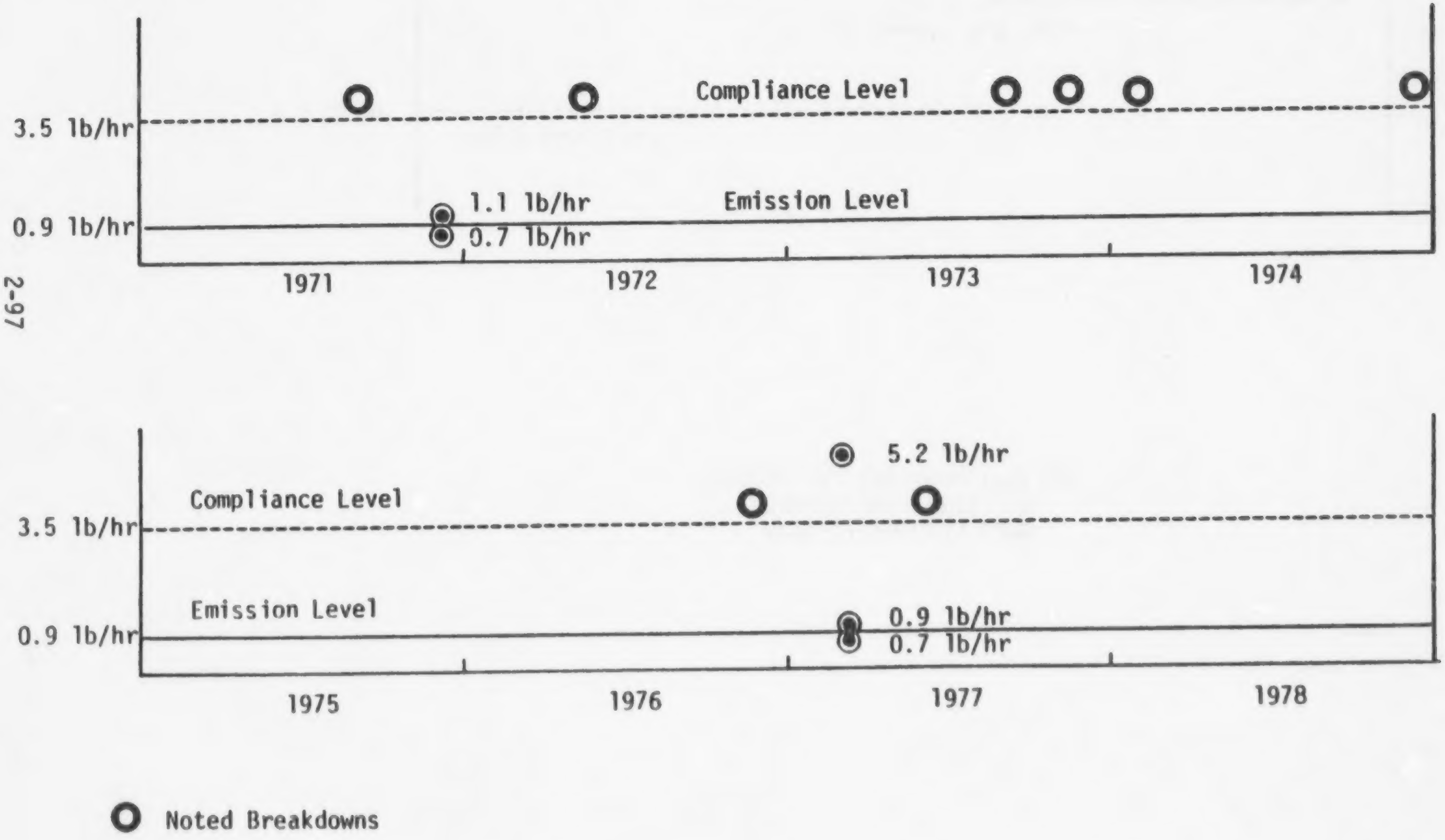
Emission Profiles

The total throughput for the perlite process is 1.5 tons per hour. The compliance level established by the APCD is 3.5 lb/hr. The emission level has consistently tested in the range of 0.9 lb/hr with exception of one test in February 1977 when one of the bags broke in the baghouse. The source has been cited seven times for fugitive emissions which are noted on the annual profile.

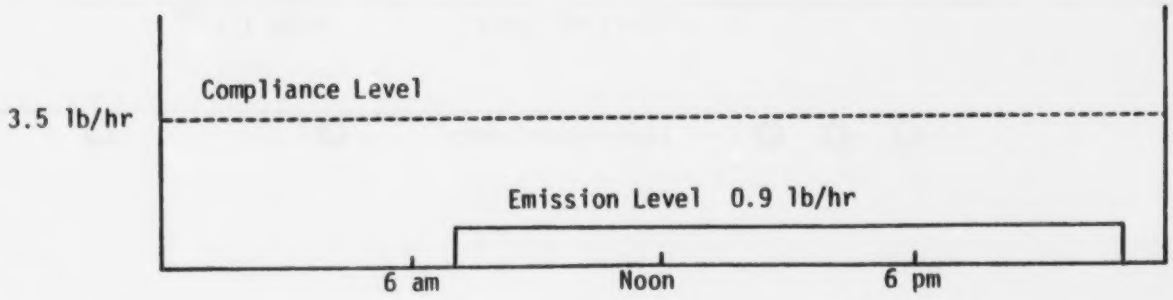
Conclusion

The source processes perlite. The main air pollution concern is mineral dust venting or escaping from the process. The dust is collected in cyclones and finally controlled by a baghouse. The abrasive quality of perlite has caused occasional leaks in the process. The interaction with APCD has resulted with source becoming more diligent in their maintenance program.

PERLITE PROCESS LINE
MINERAL DUST EMISSION



PERLITE PROCESS LINE
MINERAL DUST EMISSION
TYPICAL DAY EMISSION PROFILE



MINERAL PROCESSING PLANTS
Source No. 2

Facility Description

The company processes and produces sand for use in the production of glass containers, stucco, roofing paper, and miscellaneous applications such as sandblasting material. The plant production rates are consistent year round with approximately 50 percent of the product used by the glass industry, and the remaining 50 percent used by the construction industry. The facility, which has been at this location for approximately 50 years, is staffed by 75-80 employees, and is located on 530 acres in a rural location. Pollution control equipment was first installed in 1964.

Key Operations and Pollution Control Equipment

Principle operations include the recovery of raw material from a pit and its preliminary cleaning and classification. The material is separated by classification, and routed to either a glass sand process feed stock pile or a construction sand process feed stockpile. Each separate process again classifies the material, and cleans it before being stored in holding bins. The material then enters one of two drying operations. The primary dryer is a Fuller fluid bed natural gas-fired dryer with diesel oil backup, and is controlled by a cyclone and wet scrubber in series. There is a Ruggles Coles natural gas fired, with diesel oil backup rotary dryer controlled by a cyclone in series with a wet scrubber, which is used as a standby unit for the fluid bed dryer.

After passing through the drying operation, the material enters a bucket elevator, and is delivered to the screen house where it is classified for the last time before entering one of the holding bins. Dust from the screening operation is controlled by a rotoclone in series with a marble bed wet scrubber. The product is either fed to a four-tube bagging machine, controlled by a rotoclone in series with a wet scrubber or to a truck and/or railroad car bulk loader.

The bulk loading operation has been the primary air pollution concern at this facility. The operation was subject to excessive fugitive dust emissions during loading and was denied a Permit to Operate in 1970. A baghouse and appropriate ducting were installed in 1971, and was replaced in late 1977 and early 1978 by a wet scrubbing system due to performance problems.

Decision Making

Due to excessive fugitive dust emissions from bulk loading operations, the APCD advised the company that corrective measures were needed. The local management, while in communication with corporate headquarters, wanted to install a wet scrubber since this control technique was operating in compliance on other dust producing operations at the site. Although there is no correspondence to confirm the fact, the local management claims that the APCD recommended that a baghouse would be a more effective method of pollution control than a wet scrubber. The decision was made to install the baghouse, and corporate engineers were assigned to help with the design elements. There was some speculation, at the time, that due to the nature of the product, the baghouse would become blinded during humid conditions.

During windy weather conditions, the collection system for the baghouse proved inadequate with resultant fugitive dust emissions. After several attempts to adjust the existing equipment, a decision was made in 1972 to construct a building to enclose the loading operation. In 1977, it was decided to replace the baghouse with a wet scrubber because of performance and reliability problems.

Financial Impact

The capital cost of the process equipment was $250,500, and the installation of the baghouse and appropriate ducting cost $53,500. Normal maintenance was projected at $6,000 per year exclusive of labor. After performance problems during windy conditions, an enclosure was constructed at a cost of $56,000. The scrubber to replace the baghouse cost $37,000. Projected maintenance costs were expected to be from negligible to minimal.

Performance and Problems

The collection hoods of the baghouse proved to be inadequate during windy conditions resulting in excessive fugitive dust emissions. Attempts to adjust the flow rate of the baghouse failed. When sufficient velocities to collect the fugitive dust were tried, portions of the product were entrained in the air stream causing excessive abrasion in the dusting and on the fan blades. Under these conditions, the fan blades had an operational life of 3 weeks compared to a normal life of 6 to 8 months. This was an unacceptable alternative because of increased maintenance costs.

The problem with the blinding of the bags became apparent after the loading operation had been enclosed. The problem stems from the nature of the clay silica product the company deals with which expands in the presence of moisture. When the dust is entrapped in the bags and is subjected to moisture in the air, it expands and is effectively locked between the fibers of the bags. The normal cleaning mechanisms of the baghouse were ineffective against this phenomenon, and the bags would be blinded after approximately 8 hours of operation. The normal pressure drop of the unit was 6 inches of water column, but as the bags were blinded, the pressure drop increased to 19 inches and the displacement dropped from 11,000 cfm to 2,000 cfm. Compounding the problem was the possibility of the structural collapse of the baghouse due to the weight of the product within and the structural stresses exacted by the difference in ambient and internal pressure.

The company tried six different types of bags to no avail. In addition, the bags were dry cleaned every 30 days. None of these steps prevented the recurring blinding of the baghouse. The company did not curtail operation of the process when the control system was down. In the first 9 months of 1977, the baghouse was nonoperational, and the company halted its efforts to keep the equipment operational. The company then submitted an application to construct a wet scrubber to replace the baghouse. The installation was completed in the first half of 1978, and has performed satisfactorily since the start of its operation.

Chronology of Permits and Exceedances

In late 1969 or early 1970, the company first applied for a Permit to Operate its bulk loading equipment. On June 23, 1970, the permit was denied because of excessive fugitive and visible emissions. The company applied for an Authority to Construct a baghouse on November 13, 1970, which was granted by the APCD on December 2, 1970. The company was then operating under a compliance schedule. The unit was again denied a Permit to Operate on November 5, 1971, because there were still excessive fugitive and visible emissions during windy conditions. There are no records depicting the dates of a variance granted, except a February 1972 letter requesting a progress report required by conditions of the variance.

In June 1972, an Authority to Construct was authorized by the APCD for an enclosure around the truck loading operation. A Permit to Operate was first granted for this process in September 1972, and was renewed each year indicating the APCD considered the process to be in compliance. An Authority to Construct was issued in October 1977 for the wet scrubber to replace the baghouse.

Emissions Profile

The process is subject to several regulations; visible emissions limitations, fugitive dust, and an allowable limit based on process weight rates. The quantity of the material processed allows the maximum compliance rate of 40 pounds per hour. The process was generally considered out of compliance until the loading area was enclosed in 1972. Since the process has not been source tested and there are no noted violations after 1972, a meaningful emission profile can not be constructed. After 1972, the process was considered in compliance by the APCD, even though the source has noted that the use of the baghouse was intermittent. Presently, the process is controlled by a wet scrubber and there are no compliance problems.

Conclusions

The company claims that the APCD mandated the baghouse over the originally proposed scrubber because it was a more effective control technique than the scrubber. This is in light of the fact that scrubbers on similar dust producing operations were operating in compliance. The company also claims that it suspected the blinding problem would be realized but that the possibility had no effect on the decisions of the APCD. Although there are no records of exceedances after the control equipment was installed, the company claims it bypassed the baghouse during equipment failures and did not curtail loading operations. The end result has been a nearly total failure to continue operations while using the baghouse, and many hours of noncompliance were experienced while much time and expense were expended needlessly.

MINERAL PROCESSING PLANTS

Source No. 3

Facility Description

The source includes a hot mix asphalt batch plant and a sand and gravel operation. The source has been in business for 21 years, and is currently operating at $1,500,000 business per year. The site contains 75 acres and is located well outside of the urban perimeter. There are 20 employees. Approximately 400 tons of material are processed through the hot mix asphalt batch plant per hour. Normal operations occur 8-1/2 hours per day, 5 days per week.

Key Operations and Pollution Control Equipment

The regulated processes at the source include: 1) a Madsen cement treated batch plant vented to a baghouse filter, 2) a Madsen Model 481, 6,000 lb asphalt mix batching plant with a cyclone and a triple tube wet house scrubber, 3) a Madsen Model 481, 8,000 lb asphalt batching plant with cyclone, triple tube wet house scrubber, and a baghouse dust collector on the cyclone, 4) rock crushing and Symons flat deck screening plant with a control system at principle dust points, and 5) a Kolman portable screening plant, 4 x 8 ft, controlled by keeping the process material wet.

Decision Making

When the source switched from a wet to a dry crushing and screening process, they began to have dust emission problems. The APCD required the source to use water sprays and wetting agent at all times to control the dust problem. According to the source, the wetting agent interferes with the oil coating later in the process. Consequently, the source only uses the wetting agent during certain weather conditions (i.e., hot and dry) or when the APCD inspector is visiting.

In response to previous violations, the plant workmen keep a close watch on the emission problem points. Corrective action is initiated promptly. The basic plant philosophy centers around not being caught in violation, rather than meeting compliance levels at all times. The source implied that they do not use the pollution control system on the secondary rock crushers during predawn operating hours or heavily overcast days.

Financial Impact

The hot mix asphalt plants are controlled by wet house scrubbers. These were installed in 1957, and the source has had no problem with them. The 6,000 lb asphalt plant cost $400,000, and the attendant wet scrubbers cost $69,000. The hoods over the asphalt conveyor belts were installed in June 1978. This equipment cost $10,000. The primary crusher is controlled by a water spray when needed. The secondary crusher is controlled by a water and detergent spray. The detergent cost is $181.50 a barrel. Two barrels per month would be used in this process if the source used it continuously according to APCD specification. However, the source uses less than two barrels per month because they titrate the use of detergent against weather conditions and APCD site visits. The capital cost for the rock crushing operation was $850,000 and $26,000 for the pollution control.

The source is considering installing a baghouse for the secondary crushing plant. The proposed baghouse would cost $70,000 and the attendant ducting, $10,000 to $20,000.

The capital cost of the CTB plant was $78,000. The cement storage silo cost $8,000 and the controlling baghouse, $700. The portable screening plant cost $25,000.

Performance and Problems

The source operated a wet process rock crushing operation until 1974. The water kept the dust emissions to a minimum, and there were no violations. The wet process became increasingly expensive primarily because of the costs associated with 1) the fuel needed to dry the material, and 2) ponding and land filling the sludge. The source switched to a dry process operation with attendant water sprays to hold down the dust. The source began to incur violations for emissions at the dust points, e.g., at the drop tube to the storage pile and at the flat deck screen. The source was taken to court and fined.

In mid-1975, the APCD advised the source about the air problem and visible emissions associated with the use of diesel fuel on the asphalt conveyor belts. In the case of hot mix asphalt silo storage operations, the conveyor belt from the batching equipment to the silo is coated with diesel fuel in order to prevent a sticking problem at the drop point. When the conveyed asphalt reaches the drop point at the end of the belt, visible vapors are released from the heated diesel fuel. The source attempted to use a commercial type detergent mixed in a water spray to correct the situation, but found it to be unsatisfactory. The source eventually improved their method of spraying the conveyor belt by controlling the amount of diesel fuel sprayed. Also, the drop point was hooded and the emissions vented back into the dryer. Before the source perfected their process, they received two Notices of Violation.

Chronology of Permits and Exceedances

In June, 1970, the source was granted the initial permits to operate: 1) a rock crushing and screening plant using a wet process; 2) two hot mix asphalt plants; 3) a portable screening plant; and 4) a continuous pugmill with cement silo. In April 1972, the source was granted a permit to operate for a continuous pugmill cement treated base plant with cement silo vented to a baghouse filter.

The source received a notice of violation in May 1974, for excessive dust emitted from the flat deck screen. Another violation notice was issued to the source in January 1975, for excessive dust emitted from the drop tube at the storage pile. A criminal complaint was lodged against the source. The source was found guilty by the court and paid a $75 fine.

In October 1975, the source received a Notice of Violation for excessive hydrocarbon emissions emanating from the top of the asphalt storage silo. Again in May 1976, the source received a violation for the same reason. Criminal charges were filed by the APCD and later dropped because the source retained an engineering firm to solve the emissions problem. Later in October 1976, the source was granted a permit to operate for a hood vented to a dry burner for the asphalt conveyor.

Emission Profiles

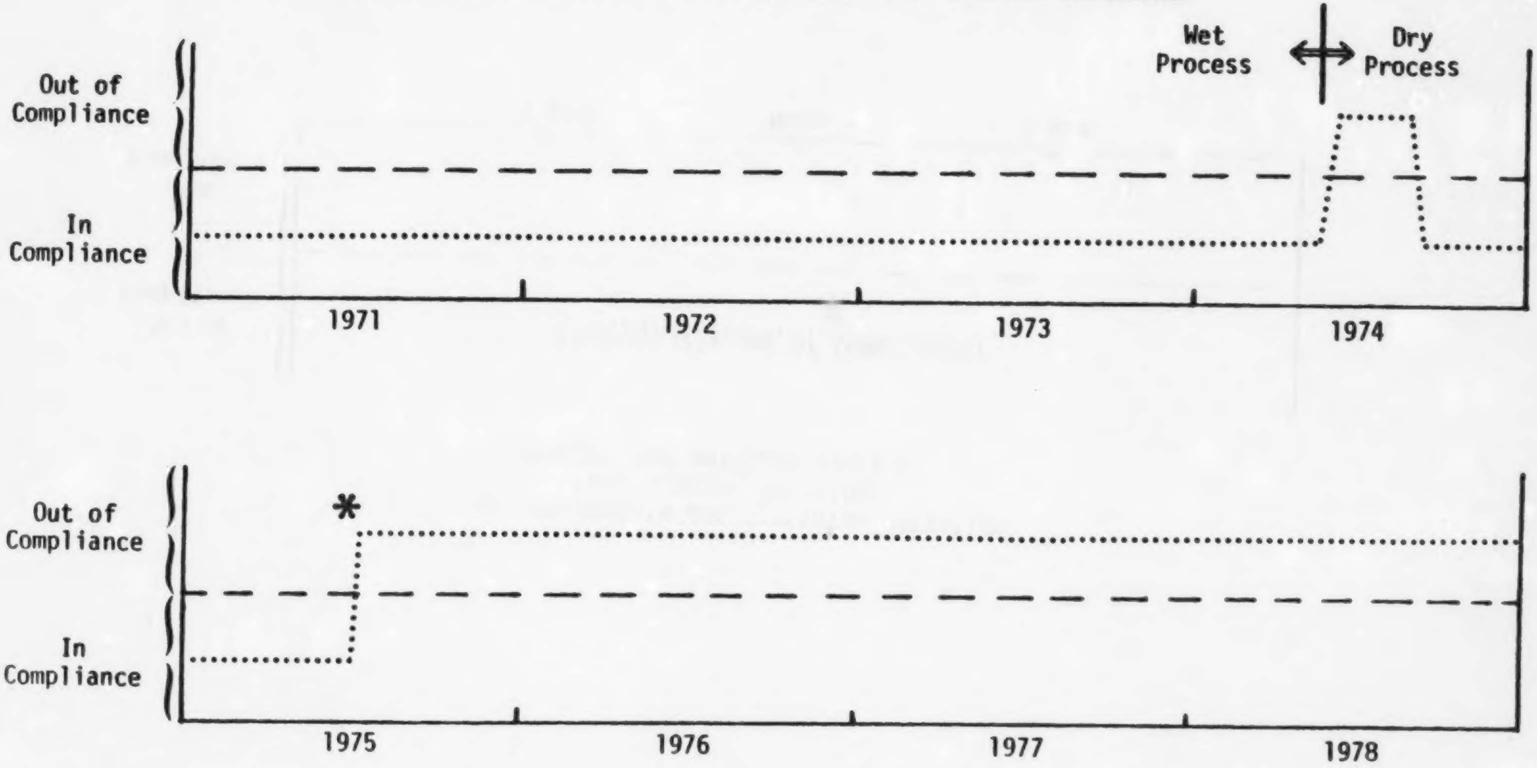
The source used a wet process in the secondary rock crushing and screening operation until 1974. The wetness of the material kept the particulate emissions to a minimum, and the operation was fully in compliance.

In 1974, the source switched to a dry process with attendant sprays. The secondary crusher and screener began to have an opacity problem, especially on a hot dry day. The source received a violation notice in May 1974 and was required by court action to initiate the use of a wetting agent in the sprays. After using the wetting agent for approximately 9 months, the source found it decreased the quality of their product. Consequently, the wetting agent is presently used only during visits by the APCD inspectors or on exceptionally hot, dry days. The source maintains the emissions are the same with or without the wetting agent. Regardless, they are technically out of compliance with their permit conditions.

Conclusion

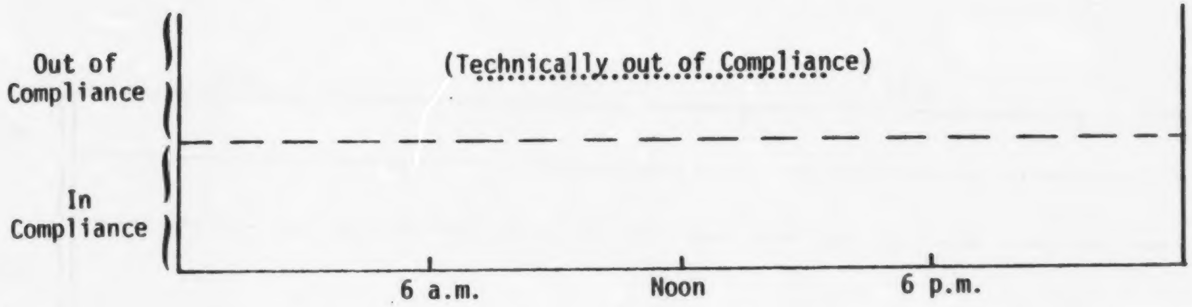
The source includes a hot mix asphalt plant and a rock crushing and screening operation. The primary pollution problem is dust emissions from the secondary crushing and screening operations. The Permit to Operate specifies that the process should be controlled at all times by a spray mixture of water and wetting agent. However, the source only uses the wetting agent on hot, dry days or when the APCD inspectors are visiting. The source maintains the wetting agent interferes with the quality of their final product (asphalt) and has no pronounced effect on dust emissions. The source is considering installing a baghouse to control the dust emissions. The baghouse has a projected cost of $80,000 to $90,000. The basic plant philosophy is not to be caught in violation.

SECONDARY CRUSHER AND SCREENING OPERATION - PARTICULATE EMISSIONS



* Technically out of compliance

SECONDARY CRUSHER AND SCREENING OPERATION
PARTICULATE EMISSIONS
TYPICAL DAY EMISSION PROFILE



MINERAL PROCESSING PLANTS
Source No. 4

Facility Description

The company is involved in rock and sand production as well as transit mixed concrete manufacturing. The company owns a number of plants and has been at this 250-acre location since 1960. The facility operates 8 hr/day, 5 days/week, and employs approximately 30 persons. Operations are subject to weather conditions.

Key Operations and Pollution Control Equipment

There are three transit mix plants at this location. The cement silos are controlled by passive baghouses during loading operations. Dust from truck loading at each plant is controlled by a self-designed collapsible hood vented to an induced draft baghouse.

The rock and sand operation, which is the primary air pollution concern at this location, consists of one jaw crusher, three cone crushers, and one gyro-disc crusher. In addition, there are a number of screens, washers, and conveyors. The capacity of the rock and sand operation is 650 tons/hour. Dust from the cone and gyro-disc crushers is controlled by a Johnson-March Chem-Jet wetting system. Access roads and yards in the plant area are watered or otherwise treated to minimize dust from mobile traffic.

Decision Making

Daily operational decisions are performed by the local management. Decisions regarding pollution control and its maintenance are the responsibility of corporate headquarters. Prior to the hiring of a full time environmental engineer in 1975, the company's concern for pollution control was minimal and was in response to pressures from the APCD. The company has recently adopted a preventative maintenance program for its pollution control equipment, but it is currently limited to a team of mechanics which travel from plant to plant. Should a breakdown of the control equipment occur, production continues and the equipment is by-passed until mechanics arrive and effect repairs. The company is becoming more responsive to pollution concerns.

Financial Impact

The cost of purchase and installation of the Johnson-March Chem-Jet dust suppression system was $37,000. The system costs approximately $4,000 per year to operate, and maintenance totals $1,000 per year. These figures represent less than one percent of the operating capital for the rock and sand operation.

Performance and Problems

The company was advised by the APCD in early 1970, that fugitive dust emissions from crushing operations and access roads were excessive. The company responded by watering the roads and installing water sprays on the crushers. Although this helped control the problem, the water sprays were not entirely satisfactory. In late 1971, and early 1972, the company installed a Johnson-March Chem-Jet dust suppression system. After the initial shakedown adjustments were made, the system has worked well.

Chronology of Permits and Exceedances

In response to the APCD, the company installed water sprays on the crushers in 1970, but their performance on dust suppression was unsatisfactory. The company applied for and was granted an Authority to Construct the Chem-Jet system in June 1971. After shakedown operations the process received its first Permit to Operate in July 1972. In July 1974, the company applied for and received an Authority to

Construct for the addition of the gyro-disc crusher and associated Chem-Jet system. The Permit to Operate was modified to include the new crusher, and reissued in March 1976. Permits to Operate have since been reissued annually.

Emissions Profile

Both the company and APCD feel that emission factors quoted in AP-42 are grossly in error for the rock and sand operation. PES feels that emission factors would be closer to 3 lb/ton of rock produced due to the moisture content of the material processed.

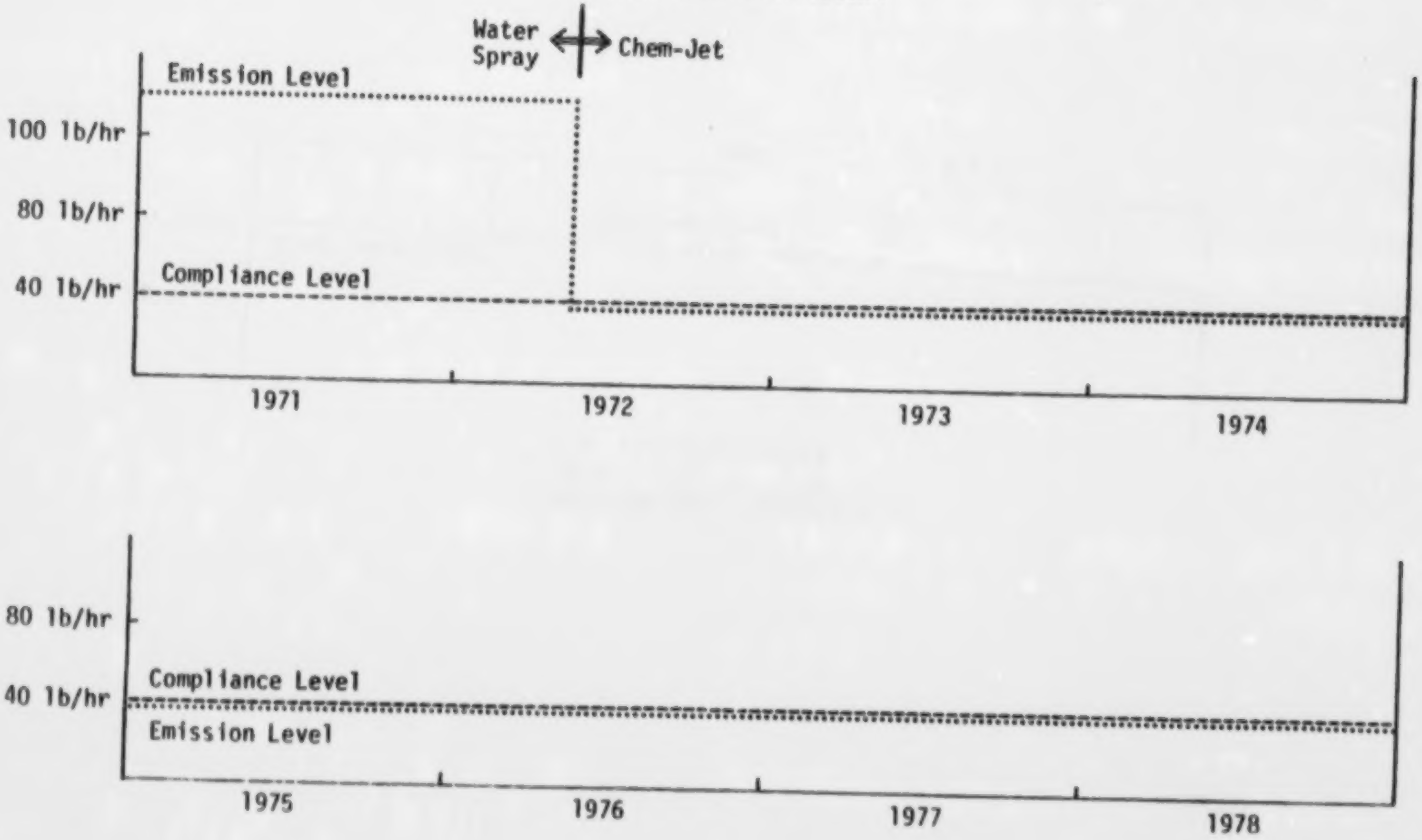
The process is subject to visible emission limitations and has been considered in compliance since the addition of the Chem-Jet system in 1972. Water spray control technology is rated as 90-95 percent effective. Admittedly, the control efficiency of the Chem-Jet system is unknown, but in this case it has been shown to be more effective than the water sprays, hence, a control efficiency of 98-99 percent would not be unreasonable.

At the production rate of 650 tons/hour the resultant emissions prior to control would be 1,950 lb/hour. With a control efficiency of 98 percent, emissions would be 39 lb/hour.

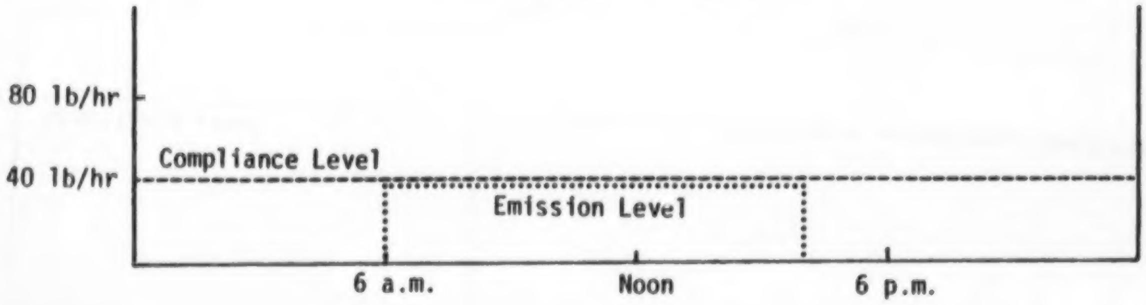
Conclusions

The cost of pollution control is minimal when compared to the operating costs of the process. Although until recently the company's concern for pollution control has been in response to APCD pressure, there appear to be no major problems with bringing the plant into compliance with visible emission limitations. The crushing operations have not been tested for compliance with emission limitations based on process weight rate, hence application of the regulation is not possible. Since the equipment involved does not emit dust from a stack, source testing is not yet practicable.

ROCK AND SAND PRODUCTION
PARTICULATE EMISSIONS



ROCK AND SAND PRODUCTION
PARTICULATE EMISSIONS
TYPICAL DAY PROFILE



GRAIN HANDLING
Source No. 1

Facility Description

The source is a retail feed manufacturer producing a large variety of feed for poultry and livestock. The source was established at this site in 1916. The site is a square block of city land with an adjoining filling station. The site is serviced by a railroad spur and a truck docking area. Twenty-eight people are employed at the site. Normal operations occur 8 hr/day, 5 day/wk.

Key Operations and Pollution Control Equipment

The grain is processed through several operations and transfer points. Each process may emit particulates. The emissions are controlled through various combinations of covers, cyclones, and baghouses. Briefly, the grain is received from railroad cars and stored via movable belt conveyor, screw conveyor, and elevator. Next, the grain is cleaned and recleaned with the particulates controlled by a cyclone and baghouse. The grain rolling operation consists of a steamer, roller, cooler, and cyclone. The grain grinding operation consists of a hammer mill, cyclone, and baghouse. The grain cracking operation consists of grain cracking equipment, cyclone, and baghouse. The pelleting operation consists of a pellet mill cooler and cyclone. Finally, the finished feed operation consists of formulating equipment, bulk truck loading facilities, and feed bagging machines.

The other regulated equipment is on the adjoining filling station which includes a vapor recovery system.

Decision Making

The source is generally supportive of air pollution control. Especially since the controls have proven to be cost effective. The company executives understand the need to control the dust nuisance problem, but do not appear to fully understand the health problems associated with smaller, invisible particulates.

The source has had to modify some of the work habits of the employees and develop a consciousness about dust control, e.g., covering grain piles or skirting transfer points.

Financial Impact

The source purchased a baghouse and pipe vacuum for the milo cracker and the grinder for $4,300. For the adjoining filling station, two vapor control systems were purchased at the costs of $800 and $315. The estimated cost for the dust control tunnel for the rail car unloading is $200,000 (one of several control strategies being considered).

The annual maintenance expense on the baghouse is $750. The annual depreciation expense amounts to an additional $250. The air pollution control devices in the grain receiving and feed manufacturing equipment are cost effective, i.e., the recaptured dust is more valuable than the expense incurred to trap it. In addition, the reduced cost level diminishes the chances of a cereal dust explosion.

Performance and Problems

In 1970, the source installed a new baghouse and vacuum pipes to the milo cracker and the grinders. This brought the equipment into compliance and a Permit to Operate was granted in 1972. However, at the same time the grain receiving and storage system was denied an operating permit. Dust emissions of 50 percent opacity were noted during unloading operations from a hopper bottom rail car. The source responded by covering the receiving pits and unloading conveyor and by enclosing the chutes used for dropping materials into the receiving pits. The APCD reinspected the receiving operations and granted the Permit to Operate.

The source is anticipating stricter control requirements for the grain receiving operation. They have studied the possibility of adding a suction apparatus to the screw conveyor and/or fully enclosing the rail car operation.

During the plant inspection, the interviewers observed a rail car unloading. The transfer point was not skirted and a pile of grain was accumulating on the ground. However, there was no particulate problem because the air was calm, but a moderate wind could have created an opacity problem.

Overall, the feed plant is in compliance with the air pollution regulations. Most of the control equipment is geared to prevent the nuisance problems that are so aptly measured by opacity readings. The small, invisible particulates which are the major health concern are not regulated or monitored.

Chronology of Permits and Exceedances

In March, 1972, the source was granted a Permit to Operate both the grain grinding and cracking operation and the pellet and finish feed operation. The grain receiving and storage operation was denied a permit due to excessive visible emissions. Two months later, the grain cleaning operation was granted a Permit to Operate after a baghouse was added. Finally, the grain receiving and storage operation received a permit in August, 1972. The equipment modifications included covering receiving pits and the unloading conveyor to prevent dust emissions.

In July, 1978, the source was granted a Permit to Operate a gasoline dispensing facility. This facility includes a vapor recovery system.

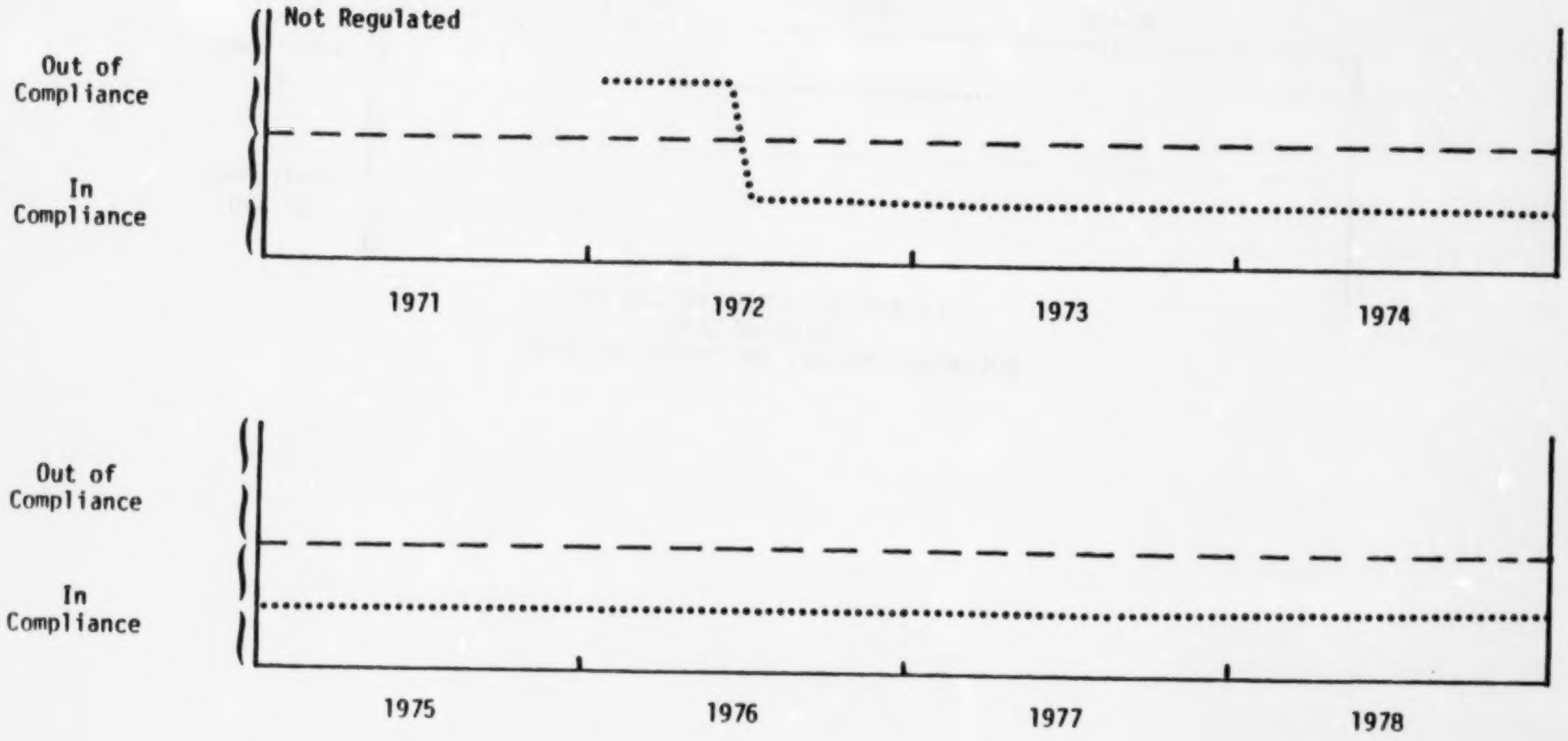
Emission Profiles

The APCD began regulating the processes of the feed manufacture in 1972. The grain unloading and storage operation had an opacity problem which was solved by covering the receiving pits and unloading conveyor and by enclosing the chutes used for dropping materials into the receiving pits. The source is presently in compliance.

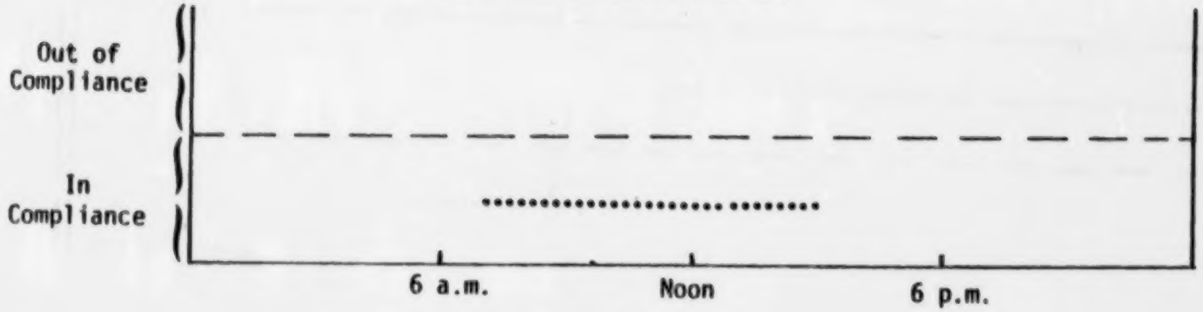
Conclusion

The source is a manufacturer of retail feed for poultry and livestock. Grain is received and processed into feed. Each process and transfer point may emit particulates. After the initial prompting to control emissions, the source discovered that the captured particulates (grain dust) over time were more valuable than the cost of the control equipment. Understandably, the source is generally supportive of air pollution control.

GRAIN UNLOADING AND STORAGE OPERATION
DUST EMISSIONS



GRAIN UNLOADING AND STORAGE OPERATION
DUST EMISSIONS
TYPICAL DAY EMISSION PROFILE



GRAIN HANDLING
Source No. 2

Facility Description

The facility is located in an industrial area on a waterfront. The process discussed in this case study is owned by a public district and is leased and operated by two privately owned companies. The operation of the process is intermittant, but average operations are from 8 to 16 hours/day for 7 to 10 days per month. The operation is an unusual situation since the public district is responsible for authorities to construct and major maintenance due to ownership, and the lessees are responsible for permits to operate and minor maintenance because they operate the equipment.

Key Operations and Pollution Control Equipment

The process is a bulk handling and loading system for ships. The system, which was built in 1963, consists of a railroad car unloading facility, car dumper, and associated belt conveyers, a travelling loader, and auxiliary buildings. Dust from the railroad car unloading facility is controlled by baghouses as are critical transfer points on the conveyor system. In addition a hatch shroud was designed and constructed to control major dust emissions from loading ships, which is vented to W.W. Sly Company baghouses. The hatch shroud has been the major pollution control concern of the operation.

Decision Making

Decisions regarding the maintenance of the facility are made by the manager of the facility and are subject to approval from top management when involving large monetary expenditures. Decisions of the lessees are also performed by the regional managers and would be subject to approval from top management if involving large expenditures for pollution control. This has not been the case due to arrangements between the lessor and lessees.

The APCO advised the lessor that it would initiate cease and desist proceedings in 1971, if steps were not taken to control the fugitive dust emissions from the loading operation. The lessor decided to study the problem and subsequently submitted a compliance schedule. Problems ensued with the effectiveness of the control equipment and decisions were upheld to continue the control program. The lessees agreed to bear costs and responsibilities of operations of the loading shroud, but by joint agreement the lessor would remain responsible for continued maintenance of the rest of the system.

Financial Impact

The basic cost of the equipment, including support structures, was $6,400,000 and the initial pollution control costs were $570,000. Additional modifications to the control system cost approximately $45,000. The lessor did not have exact financial records on the cost of operation of the pollution control equipment, but estimated maintenance costs at $100,000 of the $500,000 yearly maintenance budget.

The leasees estimated operating and shroud replacement costs at approximately $4,000 per year, which is split between the two companies. Lessee "A" was fined $1,500 for violations in 1978, and Lessee "B" was fined $800 for violations in 1978. Both companies estimate that operation of the pollution control equipment cost approximately 10 percent of their profits, and that the installation of the equipment raised rental costs of the facility by more than 100 percent.

Performance and Problems

Due to complaints from neighbors in 1971, the leasor was contacted and advised to correct dust emissions from the loading operation. A study of the problem commenced and a compliance schedule was submitted with the project being completed in mid-1973. Performance problems remained and were corrected in late 1973. The process was considered in compliance until 1977, when age of the equipment and minimal maintenance has resulted in a lessening of the efficiency at the collection systems until corrective actions were needed by the APCD. The loading hatch shrouds are replaced approximately every six months, but there have been problems with preventative maintenance of the baghouses themselves. The baghouses are not equipped with automatic cleaning mechanism, and must be cleaned by manual control. The situation of ownership dictates that the lessor's personnel should operate the control equipment while the lessee's personnel can only operate the process machinery. The lessee's claim that the lessor does not perform preventative maintenance and that violations occur due to malfunctions of the control equipment from this lack. In addition, if a breakdown occurs, the lessee's have to shut down the operation until the lessors repair crews arrive.

Chronology of Permits and Exceedances

In response to complaints from neighbors and attention from the APCD, a permit to operate was denied the lessor due to dust emissions from the bulk loading facility conveyor. A control plan was submitted and approved and a permit to construct and a permit to operate under variance was granted the lessor while construction of the control system was performed. Construction was completed in mid-1973, and another authority to construct was granted for modifications to the control system which was completed in late 1973.

By agreement, permits to operate were to be issued to the lessees since the lessor did not actually use the equipment, but maintained it. Permits to operate have been issued since 1973, and the process was considered in compliance. Violations of opacity standards appeared in late 1977, due to lack of preventative maintenance of the control systems. Lessee "A" received opacity violations on December 20, 1977, January 27, 1978, and May 22, 1978. The APCD took legal action and fines were imposed by the court. Lessee "B" was also recorded as violating opacity regulations on February 9, 1978, July 11, 1978, and November 8, 1978. The APCD also prosecuted on the violations and fines were assessed. Corrective maintenance on the system is being performed by the lessor.

Emissions Profile

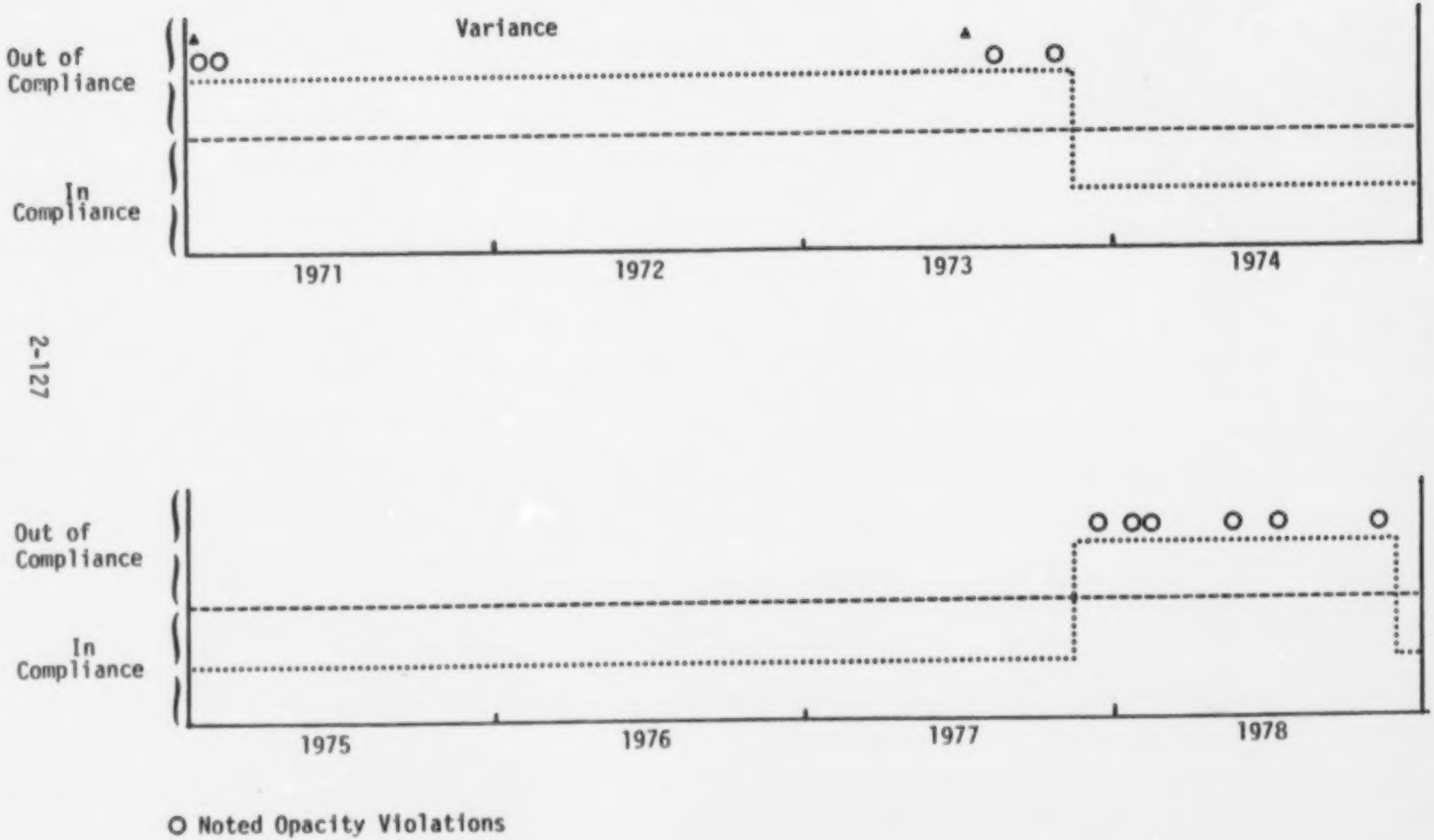
The source was notified by the APCD that they would have to install control equipment to contain the dust emissions during ship load. The source was granted a variance until mid-1973 when the control equipment became functional. The equipment was not maintained properly and violation notices were issued in late 1977 and 1978. The control equipment has been repaired and presently the source is in compliance.

Conclusions

The process is a bulk handling and loading system for ships. The process is owned by a public district (lessor) and operated by two private companies (leesees). This lessor-lessee situation has caused some difficulty in bringing the process into compliance and assuring proper maintenance. The lessees are responsible for operation of the control equipment, while the lessor is responsible for routine maintenance. The lessees claim that the lessor has not been cooperative and does not fulfill the maintenance responsibility.

Furthermore, the lessees claim that the air pollution violations could have been avoided if the lessor was not negligent. After some recent trouble in late 1977 and 1978, the process is presently in compliance.

BULK LOADING PROCESS PARTICULATE EMISSIONS



LUMBER AND WOOD PLANTS
Source No. 1

Facility Description

The source is a furniture manufacturer located in a mixed industrial, commercial, and residential district. The site contains 5.9 acres. There are 132 employees. Normal equipment operating hours are 8 to 12 hours per day, 5 or 6 days per week.

Key Operations and Pollution Control Equipment

The regulated equipment includes: 1) a William wood pulverizer which discharges to two cyclone separators which discharge to an ICA #6253 Modular III pulse clean baghouse; 2) two stain systems which are controlled primarily by using an exempt solvent; and 3) a sawdust collection system consisting of four auxilliary cyclone separators discharging to two secondary cyclone separators.

Decision Making

In 1970, the source officials and the San Diego APCD met and decided the furniture making operation did not require a Permit to Operate. The source came under the purview of the APCD when they added a wood pulverizer to their production line. Since this time the source has developed a "response" type of philosophy toward air pollution control, i.e., the source waits until there is a complaint or violation registered against them and then respond.

Initially, the source tried to correct their dust emission problem with a spray system inside the cyclone. Complaints continued to be registered and the source reluctantly installed a baghouse system. The source used open burning to clean their stain rollers until a violation was recorded and then they changed to a degreasing process for cleaning.

Presently, the source is in compliance. They express pride in this fact. However, the source does not have a preventative strategy and a new emission problem would not be dealt with until a complaint or violation was registered against them.

Financial Impact

In 1973, the source installed a Williams wood pulverizer which cost $35,000. The control equipment was deficient. Consequently, the source installed a water spray system on all three cyclones which cost $12,000. Included in this cost was the modification to the cyclones, piping, and labor.

The water spray system also proved to be inadequate. The spray would dampen the sawdust which would cling to the sides of the cyclone and decrease its efficiency. In response to a court order, the source discontinued the use of the spray system and installed a baghouse. At the same time the source corrected an unloading problem for the cyclone with the addition of an auger. The installation of the baghouse and auger cost $55,000. Maintenance on the baghouse is estimated at $5,000/yr.

Performance and Problems

Originally (1970), the source was considered exempt from the San Diego air pollution regulations and did not require a Permit to Operate. In 1973, the APCD reconsidered and began to regulate the equipment at the source.

The source avoided several air pollution problems by altering their process, e.g., 1) the source changed the solvent used in the staining process to bring it into compliance; and 2) the source stopped open burning of the stain rollers for cleaning and instituted a degreasing process.

On the basis of a complaint, the APCD cited the source for dust emission. The source was taken to court and given a compliance schedule. In response, the source installed a baghouse for the wood pulverizer.

The source maintains the emissions from the plant are not a problem except in unusual weather conditions, such as the Santa Ana condition when the humidity is low.

Chronology of Permits and Exceedances

The original meetings between the source and the APCD in 1970 were concluded with the agreement that the source was exempt from the permit to operate requirements. The APCD explained that this status would change if there were complaints from the community about wood working dust emissions. In January 1973, the source came under the purview of the APCD and obtained a Permit to Operate a Williams pulverizer with cyclones and water spray to control the wood dust emissions. Later in 1973, the source changed to an exempt solvent blend, thus avoiding an emissions problem with the wood staining process.

Early in 1975, the source added additional cyclones to the wood pulverizer to control emissions. However, the dust problem persisted. The source received its first Notice of Violation in April, 1976. In April 1977, the Hearing Board of the APCD instituted a comliance schedule for the source. The source responded by installing a baghouse which was granted a Permit to Operate in July 1977.

In August 1977, the source received a Notice of Violation for open burning of the accumulated stain on the stain rollers. The source solved the problem within a few days by instituting a cleaning process which used an APCD recommended degreasing compound.

Emission Profiles

The source installed the wood pulverizer in January 1973. The pulverizer can process one-half ton of wood chips per hour. The allowable and calculated emission levels were derived from AP-40, Air Pollution Engineering Manual and AP-42, Compilation of Air Pollutant Emission Factors. To calculate exit gas volume assume ducting to be as described in AP-40, page 373. Using the minimum volume of 2,000 scfm per ton-hour of waste and the ambient temperature.

Allowable Emissions

$$(2{,}000\ \text{scfm/ton/hr})(0.5\ \text{ton/hr}) = 1{,}000\ \text{scfm}$$

$$\frac{(60{,}000\ \text{scf/hr})(0.1\ \text{gr/scf})}{(7{,}000\ \text{gr/lb})} = \underline{0.86\ \text{lb/hr}}$$

Emission Level for Cyclone Without Water Spray

Emission Factors from AP-42, page 10.4-2. Using the closest factors.

$$\frac{(0.3\ \text{gr/scf})(45{,}000\ \text{scf/hr})}{(7{,}000\ \text{gr/lb})} = \underline{1.93\ \text{lb/hr}}$$

Calculated Emissions

For wood paste, particle size is rarely under 10 microns (AP-40, page 373). Efficiency of 85 percent for least efficient spray collection value shown in AP-42, Table A-2, page A-3.

$$(1.93\ \text{lb/hr})(0.15) = \underline{0.29\ \text{lb/hr}}$$

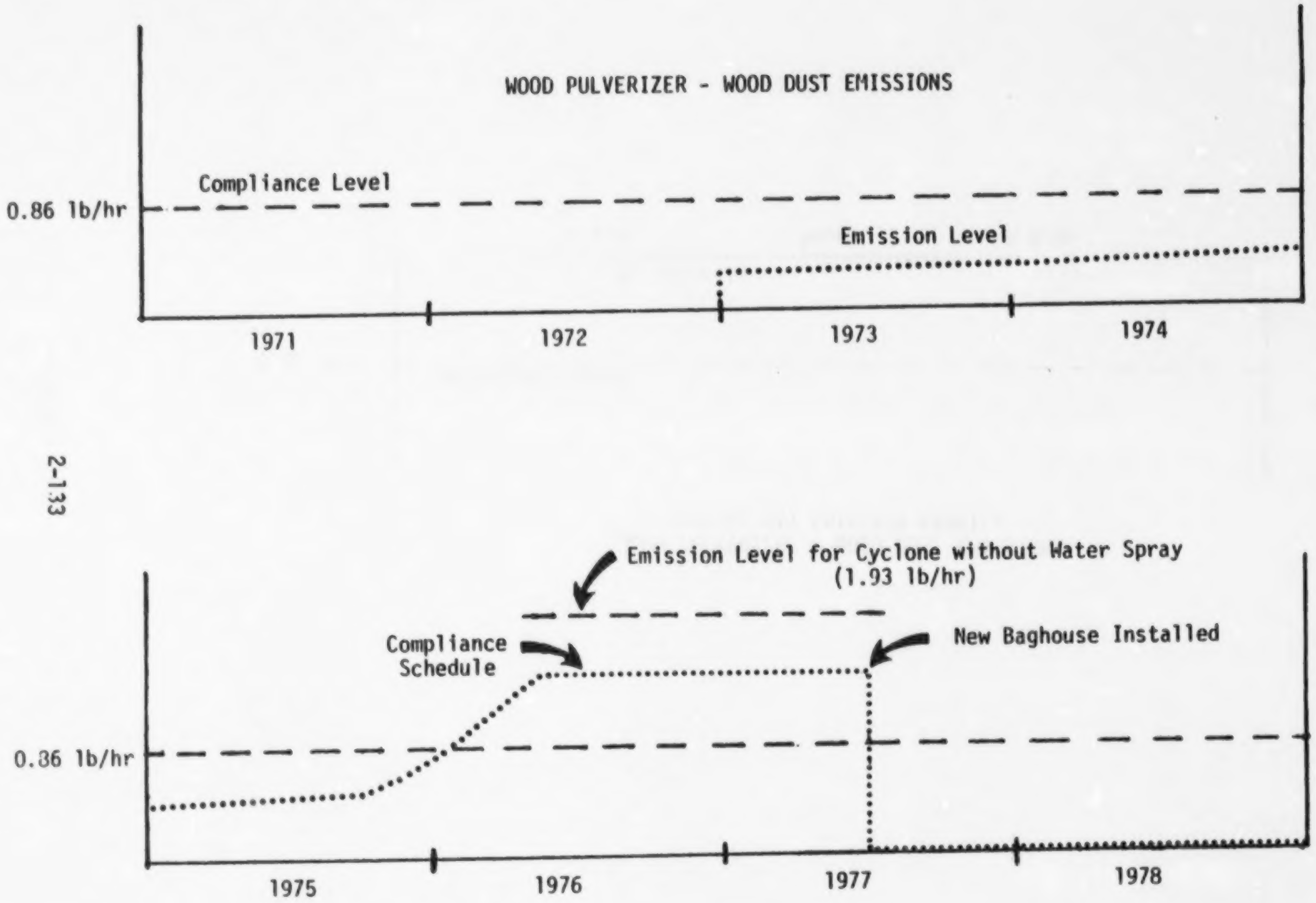
Emissions With Baghouse

AP-42, page 10.4-2 says emissions will be negligible.

The compliance level for wood dust emissions was 0.86 lb/hr. The pulverizer was installed with water sprays in the cyclone as control. Under proper working conditions the emission rate would be 0.29 lb/hr. However, the cyclone's efficiency was decreased by two conditions: 1) the wetted wood dust would cling to the interior of the cyclone; and 2) the hopper at the base of the cyclone would fill up. Complaints from the community were registered in early 1976 and the source was placed on a compliance schedule. The source discontinued the use of the water sprays and installed a baghouse which effectively dropped the wood dust emissions to a negligible level.

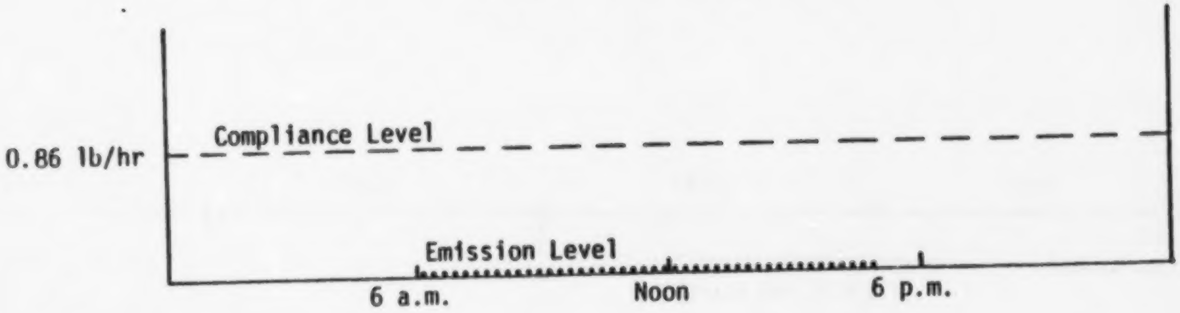
Conclusions

The source is a furniture manufacturer which has had problems with the wood dust emissions from a wood pulverizer. The source is located in a mix use district and has occasionally received nuisance complaints. The complaints have served to motivate the source into compliance. Presently, the emissions rate from the wood pulverizer is negligible.



WOOD PULVERIZER - WOOD DUST EMISSIONS

WOOD PULVERIZER - WOOD DUST EMISSIONS
TYPICAL DAY EMISSION PROFILE



LUMBER AND WOOD PLANTS
Source No. 2

Facility Description

The company manufactures furniture and has been at this location since 1969. The average yearly production rate is 1,100-1,200 chairs per month, with fluctuations of approximately 850-900 chairs per month during the winter and 1,500 chairs per month during the summer. The company employs an average of 15-18 persons with a maximum staff of 25 persons during the summer. The plant operates 8 hours/day, 5 days/week, utilizing one full shift and partial shifts when necessary to prepare materials for the following day.

Key Operations and Pollution Control Equipment

Operations center around wood working equipment such as lathes, saws, sanders, and drills. This equipment is vented to a total of seven cyclones which were mandated by California OSHA in 1973. There are also two paint spray booths; one is baffled and exhausted by a one-horsepower fan, and the other is filtered and exhausted by a two-horsepower fan. Other than the baffles and filters, the spray booths are uncontrolled. The third key operation is the stain and lacquer dip line. The conveyorized line consists of three exhaust fans with one-horsepower motors, two 55-gallon dipping tanks, and a drying tunnel equipped with two natural gas 1×10^6 Btu/hr heaters. The primary pollution concern has been hydrocarbon emissions from the organic solvents used in the staining and lacquering operations.

Decision Making

The general manager is responsible for day-to-day decisions regarding plant operations. This facility, owned by a corporation, is one of several similar plants, hence major decisions regarding pollution control are made in concurrence with corporate headquarters. When the APCD notified the company of its concern about the use of photochemically reactive solvents, the company decided that switching to exempt solvents would be more cost effective than installing control equipment.

Financial Impact

The cyclones on the wood operations cost $272,000 to install and cost approximately $3,500 per month for utilities. The financial impact of switching to photochemically nonreactive solvents was minimal. Maintenance costs for the paint spray booths are limited to replacing the filters once per month at a cost of $100. In addition, respirator filters for personnel cost approximately $150 per year. Company policy dictates that employees subject to hydrocarbon fumes receive a pulmonary function physical once per year at company expense. These physicals cost on an average of $2,250 per year.

Performance and Problems

The company uses a variety of stains, lacquers, and sealers in its wood finishing operations. With the adoption of an organic solvent limitation regulation by the APCD in 1973, the company contacted its solvent suppliers for the composition of the contents and advised them of the new regulations. The supplier responded by reformulating its products to a water base or by reducing the amount of photochemically reactive solvents used in the vehicle. During late 1973 through September 1974, the supplier and the APCD exchanged correspondence regarding the classification of its products. As a result the company switched from photochemically reactive solvents to nonreactive solvents.

Chronology of Permits and Exceedances

Regulations adopted in 1973 required the company to apply for Permits to Operate. Requirements of the APCD dictated that chemical compositions of the solvents used had to be supplied with the applications. After correspondence with the suppliers, it was determined that the company had substituted nonreactive solvents for previously used reactive solvents. The first permits to operate were issued in early 1975. There are no records of exceedances for this process.

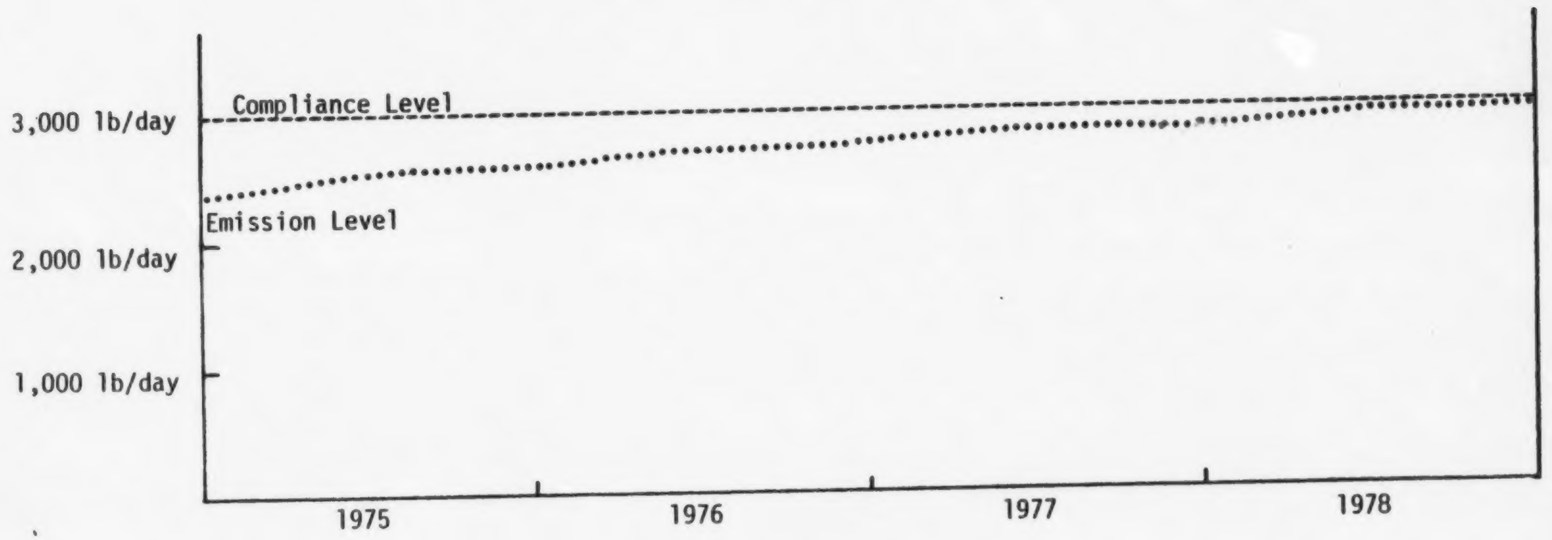
Emissions Profile

The source switched to photochemically nonreactive solvents in 1975. The compliance level for these solvents is 3,000 lb/day. The emission rate was calculated for 1977, from the actual amounts of solvents per gallon as depicted by the composition submitted by the supplier. It was assumed that the solvent usage and resulting hydrocarbon emissions are directly related to the level of production, since no significant process changes have occurred. Since 1975, the annual rate of increase in volume of business has been 5 percent per year. There is also a moderate fluctuation annually in the amount of business with the highest volume in the summer. Presently, the emission rate is precariously close to the compliance level.

Conclusions

The company felt that switching to photochemically nonreactive solvents would be more cost effective than installing and maintaining control equipment. In response to notification of the regulation, the supplier corresponded with the APCD regarding the photochemical classification of its solvents and reformulated its products to meet nonreactive standards. The cost of air pollution control to the company, aside from the cyclones required by OSHA and the expense of administration, was minimal. The major cost of pollution control in this instance was borne by the supplier.

LUMBER AND WOOD PLANTS
PHOTOCHEMICALLY NONREACTIVE HYDROCARBON EMISSIONS



SURFACE COATING
Source No. 1

Facility Description

The source involves research, development, and manufacture of magnetic recording media. The source is owned by a large international corporation. The present site has been operational for 9 years. The site has 33 usable acres plus 3 acres in a nearby location. There are 65,000 square feet of floor space in the main building and 40,000 square feet in a building on the nearby location. Two hundred twenty-five people are employed by the source.

Key Operations and Pollution Control Equipment

The key operation is a pilot plant for manufacturing magnetic tapes. In this process, a polyester film is coated with magnetic media and dried in an oven. The organic solvents evaporated in the drying process are tetrahydrofuran and methyl ethyl ketone. These vapors are collected by a 900 pound carbon adsorber with an efficiency of at least 95 percent. The process is continuously monitored for research purposes.

Other regulated equipment include: 1) a sandblast cabinet with self-contained dust collecting system; and 2) six small freon vapor degreasers.

Decision Making

The key pollution control decision was to use a carbon adsorbing process rather than incineration to meet the hydrocarbon emission requirements. The carbon adsorber was chosen for two reasons: 1) there was a chance to reclaim the organic solvents and sell them; and 2) the carbon adsorber can collect a variety of organic solvents.

Since this is an experimental facility, even small operations, equipment malfunctions, or fluctuations in readings receive the attention of the top executives. To date, there have been no air pollution violations. Part of the purpose of the pilot plant is to forecast pollution problems and prevent their occurrence in the planned full-scale plant.

Financial Impact

The process equipment for coating the polyester film cost \$100,000. The pollution control equipment cost an additional \$30,000, or 23 percent of the total cost. There are two main factors that tend to inflate the cost of the control equipment: 1) the solvent is flammable and many safety controls had to be built into the equipment; and 2) this is a small scale operation (the pollution control equipment on the planned, larger operation will amount to only 5-10 percent of the total cost).

The operational and maintenance costs cannot be determined at this point. This facility has been operating less than 3 hr/wk for fewer than 6 months. In addition, the overall cost balance could be somewhat improved by selling the reclaimed solvent (the company is presently seeking a buyer).

Performance and Problems

The pilot plant is presently operated only 2-3 hr/wk with a hydrocarbon emission rate of 0.10 lb/hr. Even without the control equipment, the emission would be less than 18 lb/day. The control equipment is not presently needed to meet the compliance level. However, this is a test situation and data are needed to plan a much larger plant to be built sometime in the future.

Chronology of Permits and Exceedances

In August 1977, the source was granted the Authority to Construct a coating dry oven with a 900 lb carbon adsorber. The Permit to Operate was granted in July 1978. A month later an APCD inspector noted an odor in the coater room, but no official sanction was taken.

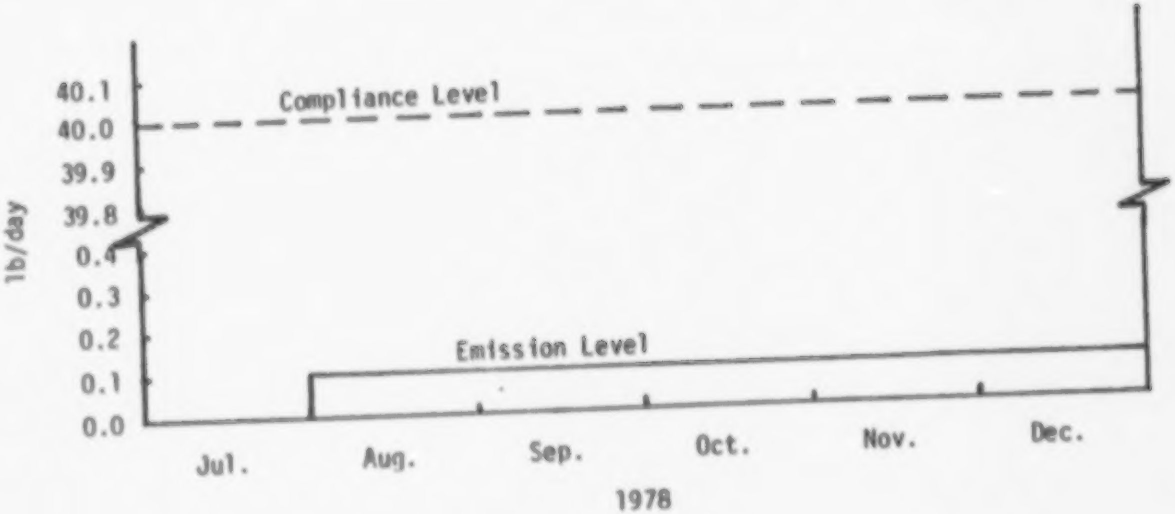
Emission Profiles

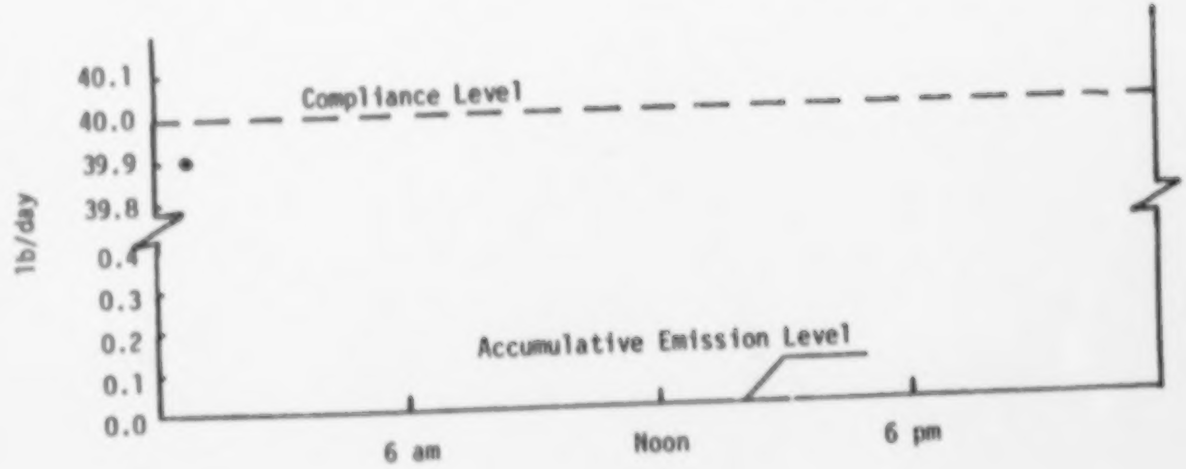
The dryer/coater came into operation in August 1978. This is a pilot plant which has a very low hydrocarbon emission rate. Even without the carbon adsorber the emissions from the dryer/coater would be within the compliance level. However, this is a test situation and the data collected will be used to plan a much larger plant.which could have compliance problems. Presently, on a typical day the coater/dryer operates for only 1 hour.

Conclusions

The primary air pollution concern is a hydrocarbon emission from a coater/dryer used in manufacturing magnetic tapes. This is a small scale pilot plant with careful monitoring of the organic solvents. The data collected at this plant is being used to plan a full scale plant. The basic goal of the manufacturer is to make the pollution control equipment economically practical by recovering the organic solvents and selling them. At this point, the control equipment recovers more than 95 percent of the organic vapors and is well within the compliance limits.

COATING PROCESS - HYDROCARBON EMISSION





SURFACE COATING
Source No. 2

Facility Description

The source produces precision tubular components for nuclear and other power-generated systems. The source's present volume of business is $8.5 million per year. The site contains 180,000 square feet of building on 7.2 acres or about 55 percent coverage. The source is located in a light industrial district and employs 140 people. The main air pollution concern involves the degreasing equipment which was installed in 1965. Presently, the process operates 16 hours/day, 6 days/week.

Key Operations and Pollution Control Equipment

The source uses a vertical degreaser for cleaning metal tubing and parts. The degreasing occurs entirely in a liquid phase. Vapors from the degreaser are collected in a condenser. Approximately a third of the liquid in the degreaser is distilled every 24 hours to remove dissolved solids. The degreasing solvent used by the source is trichloroethylene.

Decision Making

The primary air pollution-related decision revolves around the choice of trichloroethylene as the organic solvent used in the degreasing operation. The source has investigated other solvents, but has not been able to find an acceptable substitute. The source experimented with methylene chloride, but the results were so poor that the source had to scrap $530,000 worth of materials that had been processed.

Presently, the source is operating under a variance. The environmental impact of their emission level is considered minor by the APCD. Consequently, the source is waiting for a better control strategy to be proven before it attempts to alter its process again.

Financial Impact

The vertical degreaser originally cost $38,000. This included the condenser which has been subsequently modified to increase its collection efficiency. The modifications were likely cost-effective for the source, considering the cost of trichloroethylene ($3.75/gal) and the amount of reduction in vapor loss (from 9,300 gal in 1970 to 550 gal in 1978).

The largest cost to the source for pollution control was the experimental substitution of methylene chloride as the organic solvent. Modifications to the still cost approximately $19,000. Methylene chloride proved to be highly unsatisfactory for the process, forcing the source to scrap the material degreased by this solvent. The estimated cost of the scrapped material was $530,000. In addition, the source spent about $75,000 on personnel time. Understandably, the source is reluctant to experiment again with altering their process.

Performance and Problems

The primary air pollution concern is the photoreactive organic solvent, trichloroethylene, used by the source in a degreasing process. The source has successfully reduced emissions on the order of 1,500 percent during the last 8 years. The most significant reduction occurred before 1973, probably because it was cost-effective to reclaim the solvent. In 1973, the APCD began regulating trichloroethylene, requiring an 85 percent reduction. This was very untimely for the source since they were nearing the completion of their reduction program.

The source's initial response was to shift to another organic solvent, methylene chloride. This experiment proved to be costly, because the new solvent reduced the quality of their product to an unmarketable state.

The APCD regulation on organic solvents, which specified an 85 percent reduction, came into effect when the source was emitting approximately 40 lb/day. Consequently, the compliance level for the source is 6 lb/day. The source petitioned for a variance in 1975. The variance has been renewed for the last 2 years without problem. Presently, the source emits approximately 22 lb/day.

Chronology of Permits and Exceedances

In 1973, the APCD began regulating organic solvent emissions. In June, the source applied for an operating permit for a vapor degreaser using trichloroethylene as the organic solvent. The permit was granted in August.

In December 1975, the source petitioned for a variance. The Environmental Review Board filed a Notification of Negative Declaration the same month. Eleven months later the variance was granted by the Hearing Board. The variance has been extended twice at the same time the operating permit is renewed.

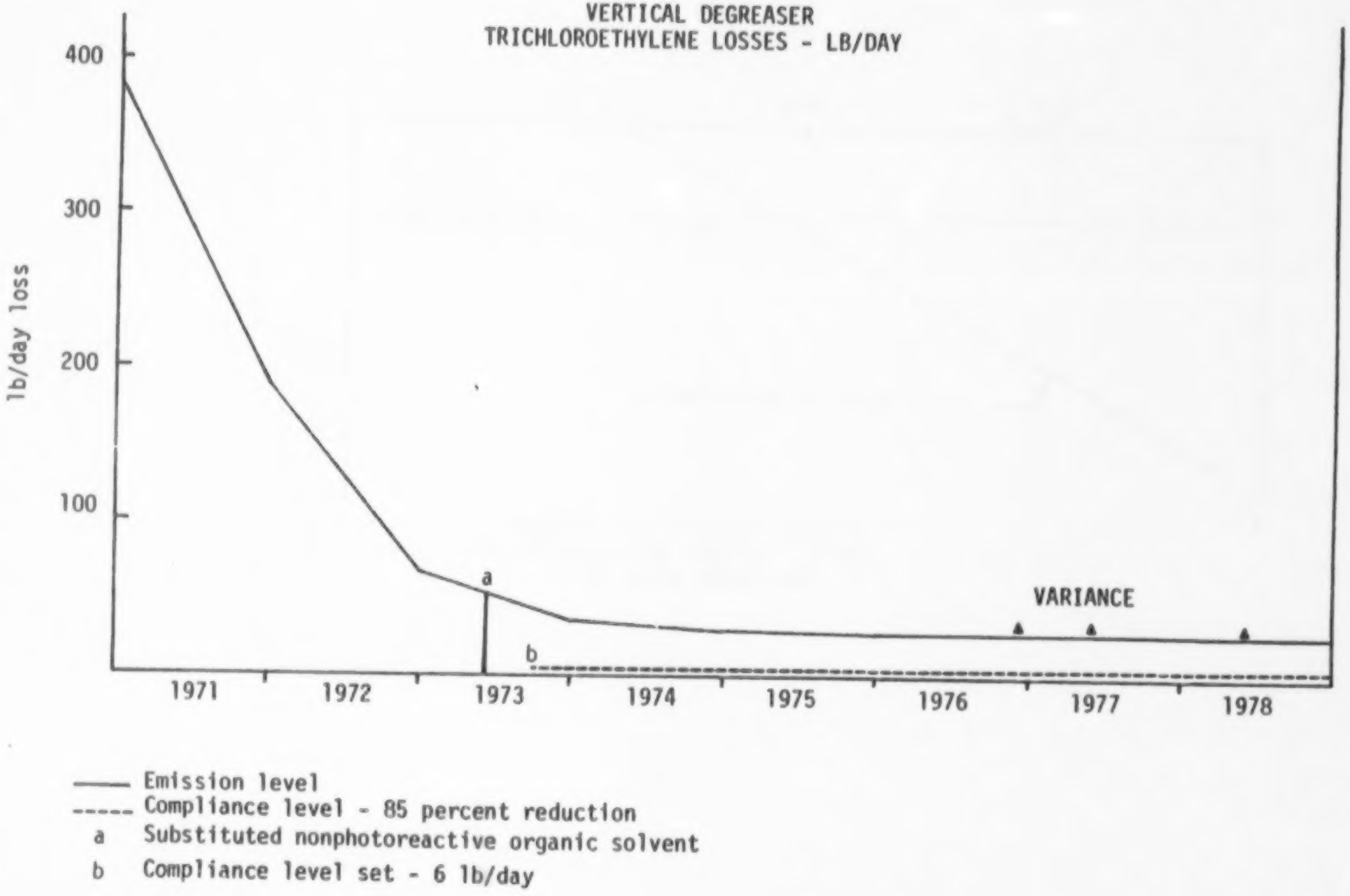
Emission Profiles

The source dramatically reduced their trichloroethylene emissions in the early 1970's before APCD regulation took effect. Soon after, the source was contacted about the pending compliance level (85 percent reduction of emissions). They briefly experimented with a nonphotoreactive organic solvent in June 1973, with the experiment ending in a failure. The APCD calculated the emission level to be 40 lb/day in 1973. Consequently, the 85 percent reduction level was set at 6 lb/day. The source has been unable to meet the compliance level but has been granted a renewable variance.

The typical day emission profile has been drawn on a different scale. The source operates 16 hours/day and emits approximately 22 lb/day of trichloroethylene.

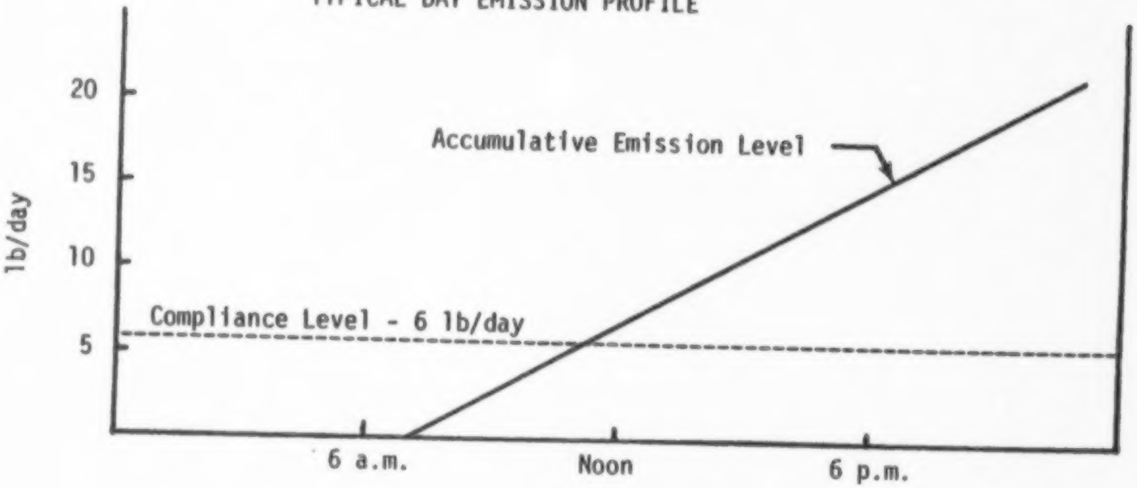
Conclusion

The source is straddled with an untimely air pollution regulation. The source uses a photoreactive organic solvent (trichloroethylene) in their degreasing process. This solvent is governed by a regulation which specified an 85 percent reduction in emission level. In the 2 years previous to the application of the regulation, the source had already dramatically reduced their emission level. When the regulation became applicable, the source found it unfeasible to reduce the emission level another 85 percent. The initial response by the source was to experiment with another organic solvent. The experiment was a failure and cost the source more than $600,000 in materials and labor. The source eventually petitioned for a variance which was granted and renewed on a yearly basis. The source was supported in their initial petition by a Notification of Negative Declaration filed by the Environmental Review Board. The source is presently operating under a variance.



VERTICAL DEGREASER
TRICHLOROETHYLENE LOSSES - LB/DAY

VERTICAL DEGREASER
TRICHLOROTHYLENE LOSSES - LB/DAY
TYPICAL DAY EMISSION PROFILE



FOOD AND DRUG-RELATED INDUSTRY
Source No. 1

Facility Description

The source is a dry rendering plant with a 7-ton per hour capacity. The source has been in business for 35 years on a 40-acre site. Since the source was founded, the surrounding community has become increasingly suburbanized. Thirty people are employed at the site. Although the plant occasionally operates 24 hours per day, normal hours are 15-16 hours per day, 5 to 5-1/2 days per week.

Key Operations and Pollution Control Equipment

The dry rendering process consists of a continuous Equacooker, a grease melting tank, expellors, grinding equipment, conveying equipment, and a Babcock and Wilcox water tube boiler and afterburner.

Over the last 8 years, a variety of odor control strategies have been tried. Presently, odors are contained by using negative pressure on the building, by hooding equipment and conveyors, and venting the air into a condensing system or afterburner, by the use of air scrubbers,and by enclosing all processes within the building. The other discontinued control systems used during the 8-year period were as follows: (1) between 1970 and 1973, a Duke VC-10 vapor controller was used until it became badly corroded; and (2) between 1973 and 1977, a system of waste ponds and aerators were utilized, but they were discontinued because they emitted unacceptable odors.

Decision Making

The company executives and plant manager are acutely aware of their nuisance problem with odors. There is a large amount of community pressure to abate odors. Indeed, developers in the area are promoting house sales on the basis that the source will be moved.

The surrounding community has gradually changed during the last 35 years from a rural area to scattered residential developments.

Decisions about control strategies are made by the main office in Chicago. The most economical approach is the standard used for choice between strategies.

The plant manager is responsible for all exceedance problems. It appears he is diligent in his performance of this duty. He comes to the plant regardless of the hour whenever a complaint is registered and attends to the problem. Also, the company employs a sniffer to monitor both the plant grounds and the surrounding area.

Financial Impact

The source estimates that 15 to 20 percent of the total capital cost of the $2-3 million facility has been spent on pollution control. A breakdown of costs on some of the processing and control equipment or strategies follows: (1) the dry rendering process, $1 million for the process, $200,000 for control; (2) the boiler, $47,000 for the unit, $13,000 for control; (3) $350,000 for various building alterations and equipment location changes to enclose all operations; (4) $52,000 for the Duke VC-10 vapor control which operated for three years; (5) for the pond aerators, $110,000; (6) for two scrubbers to replace the ponds, $200,000; and (7) $28,000 for a small scrubber on the knock-out tank. The operating cost on the now defunct pond aerators was $4,500 per month for electricity in the final months.

Performance and Problems

Rendering plants are characterized by the foul odors they emit. Hydrogen sulfide, a breakdown product of animal protein, is an example of their odorous gases. This gas can be detected by humans in quantities as low as 0.03 ppm. Protecting a surrounding community against this type of emission is a difficult task.

Initially, the source tried to comply with the APCD regulations by relocating all of the rendering equipment within the building and applying negative pressure to the enclosed air. Also, the source hooded and vented much of the equipment and installed an odor scrubber. The odor scrubber corroded after three years. Another air scrubber was installed plus waste water ponds with aerators were built. When one of the ponds became septic, the source installed additional aerators. A larger boiler and afterburner were added to the process to improve the efficiency of the combustion of vented air.

In 1977, numerous complaints from the surrounding community were filed with the APCD and the source was brought to court. The source was placed on a court-ordered compliance schedule. The ponds were discontinued and replaced by two scrubbers. The receiving dock was relocated inside the building. The source increased the use of sodium hypochlorite from 1/8 gal/day to 12 gal/day. Presently, the source is within compliance.

The source complains that there is no provision in the APCD regulations which allows for mechanical breakdown. The source explains that they do not have enough time to repair faulty equipment before court action is initiated against them.

Chronology of Permits and Exceedances

In 1970, the initial operating permit was denied because the control systems were inadequate to prevent nuisance odors escaping into the surrounding community. A conditional operating permit was issued a year later after the source had: (1) enclosed all rendering equipment within the building, (2) hooded and vented some of the equipment, and (3) installed a Duke VC-10 vapor controller.

In September 1973, the source received operating permits for a Babcock & Wilcox boiler and for aerating equipment for the waste water ponds. Within a month, additional aerators had to be installed to correct a septic condition in one of the ponds.

In the spring of 1974, the source was granted an operating permit for an air scrubber to clean the vented air from the building and the equipment.

In January 1977, numerous complaints were filed in court against the source. The source pleaded nolo contendere, was given a suspended fine of $300, and was placed on probation for a year. The source subsequently received one Notice of Violation in May and five in June. In May 1978, the Superior Court found the source guilty, required a $2,500 fine, and placed the source on a compliance schedule with the stipulation that a $250 fine would be imposed for each day the source failed to meet the schedule. The source has met the schedule.

Emission Profile

An emission profile has not been prepared for this source, since the principal complaints were directed to odor. There are no points of reference for quantitative odor emissions. Basically, the source has had numerous complaints from the surrounding community about odor. Most often, these complaints have not been recorded and now, years later, approach a level of hearsay. Presently, the source is successfully controlling the odor problem.

Conclusion

The source is a dry rendering plant located in an area which is undergoing suburban development. There is a definite conflict in the adjoining land uses. The residential developers in the area are promoting the notion that source will be closed soon. The source, on the other hand, is defensively controlling the odor as well as it can in order to minimize complaints. The source estimates that 15 to 20 percent of the total capital cost for the $2 - $3 million plant has been spent on odor abatement. At present, the source is controlling the odor problem. However, even minor breakdowns in control equipment can precipitate a detectable odor and complaints from the community.

FOOD AND DRUG-RELATED INDUSTRY
Source No. 2

Facility Description

The company is primarily involved in the raising of chickens and marketing shell eggs. The chicken ranch is located on 150 acres in the midst of a 650-acre parcel owned by the company in a semi-rural location. The firm employs 125 persons and operates 24 hrs/day and 7 days/week.

Key Operations and Pollution Control Equipment

The ranch operation presently consists of a feed mill used to process feed for the chickens on the ranch, the raising of laying chickens, and a manure processing plant. The latter has been the primary air pollution concern since 1975, when a mobile home park was constructed on the boundaries of the company's property and odor complaints started. The processing plant consists of two manure receiving pits, four digesters, two dryers, two prillers, two screens, four storage bins, and a bagging operation and truck loading facility. The pollution control system consists of a cyclone, separating particulate matter from the exhaust stream of the digesters, which is vented to a water spray tower. There is also a cyclone in series with two parallel Aerodyne Type "S" dry scrubbers which also vent to the water spray tower. After passing through the spray tower, the exhaust enters a four stage cross-flow Ceilcote Model HRPT-250 odor scrubber. The first stage consists of a packed bed condenser, while the second stage is a chlorine gas sparger. The third and fourth stages consist of packed beds with sulfuric acid and sodium hydroxide scrubbing, respectively. The liquid in the first stage is cooled by a Baltimore Aircoil Industrial Fluid Cooler, Model VSI-300-2, since lower temperatures lessen the odor potential of the waste gas stream.

Decision Making

The company is a family operation and is privately owned. Since California law states that odors from an agricultural operation are exempt from control by the APCD, a 2-year legal battle ensued in late 1975 over the issue of jurisdiction. The APCD maintained that since 30 percent of the material processed by the fertilizer plant was from outside sources, the process was industrial rather than agricultural. The company states that efforts to control odors were on the basis of being good neighbors, even though it responded to comments from the APCD.

Financial Impact

Cost figures for early process pollution control equipment were unavailable. In response to odor complaints and pressure from the APCD in 1975, the company installed a chlorine injection system that they claim was mandated by the APCD. The chlorine reacted adversely with the waste gas stream and produced amines, starting a new series of complaints. The company states that there was no major cost associated with this approach, but claimed they felt it dangerous to have chlorine on the premises. In May 1976, the company installed two Aerodyne Type "S" dry scrubbers at a total cost of $35,000. In late 1976, the company agreed to install odor control equipment but the vendor went bankrupt, and the company contracted with a consultant to design a system. The company installed a sulfuric acid scrubbing system at a cost of $59,000. Since this did not correct the problem, in 1977, the company contracted with Ceilcote for a four-stage odor scrubber at a cost of $148,000. The company claims it invested approximately $65,000 in materials and labor to perform modifications to the control systems. Chemical costs for the scrubber in 1978 were projected at approximately $60,000, and repairs and maintenance amounted to approximately $100,000. Legal fees during this time amounted to approximately $83,000. The total financial impact was approximately $550,000.

The estimated capital worth of the fertilizer plant was not readily available, however company representatives stated that the profits from the fertilizer operation in 1978 were approximately 2 percent of the 1977 figures. Company representatives also stated that the operation of the ranch was contingent on the fertilizer plant, and that it would remain in operation as a necessary cost of business. The company had a $10 million level of business in 1978.

Performance and Problems

In 1969, the company installed a water spray tower to minimize dust emissions from the waste gas stream. This worked reasonably well with some need for new spray nozzles due to wear. In response to odor complaints from new neighbors and a suggestion of the APCD, a chlorine injection system was installed. The chlorine reacted with the exhaust gas and created amines which compounded the problem. The company claims it foresaw the possibility of an adverse reaction, but that the APCD was adamant. The chlorine system was removed and plans were laid for additional dust collection equipment. It was thought, at the time, that odors were emanating from moist particulate matter escaping from the water spray tower.

Two Aerodyne Type "S" dry scrubbers were installed in mid-1976 to help alleviate the problem. Although there was an improvement, odor was still a problem and the company contacted a consultant listed by the APCD for odor control. A sulfuric acid scrubber was installed but did not appreciably correct the problem. In late 1976, the company volunteered to look for odor abatement techniques that may be more effective. A contract was let with Xerodor Company for an odor scrubber, but at the beginning of the installation the vendor went bankrupt. The company purchased the equipment and installed it with their own personnel. Odor was still a problem and in early 1977, the company contracted with Ceilcote for a four-stage odor scrubber. The installation was completed in late 1977, and the equipment passed an odor panel test and a particulate level test in February 1978. There have been no problems since that time.

Chronology of Permits and Exceedances

In mid-1975, correspondence between the APCD and the company began regarding the issue of whether or not the company was subject to APCD regulation. After an inspection of the process in September 1975, a Permit to Operate was issued. In early 1976, the facility was again inspected and a fugitive dust problem at the conveyor transfer points was noted. A compliance schedule was negotiated between the APCD and the company for correction of the problem. The APCD expected the problems to be corrected by April 1976.

In May 1976, the company applied for and was granted an Authority to Construct the Aerodyne scrubbers, and equipment to inject chlorine or an equivalent oxidizing agent between the dry collectors and the water spray tower. In addition, the company was to install nozzles that would give a finer spray in the wet scrubber. In October 1976, the plant was reinspected and it was found that little progress had been made on the compliance schedule. A Notice of Violation was filed for odor on the basis of complaints by neighbors. At this time, discussion ensued at the APCD about possibilities of revoking the company's Permit to Operate. In March 1977, the APCD petitioned the Hearing Board for an Abatement Order, but the petition was carried to the May meeting. In May 1977, the company responded with a prayer that the Abatement Order be dismissed or denied. Within the week, the Authority to Construct expired, and the company was advised to apply for another Authority to Construct.

The legal battle continued in June 1977, with the APCD requesting an Abatement Order or a new compliance schedule. The company responded with a petition for a writ of administrative mandamus to the state superior court in regard to the scheduled Hearing Board meeting in late June 1977. The state superior court responded with an order for the APCD to show cause and issue a temporary stay order. In late June 1977, the superior court denied the writ of mandamus but extended the stay order for an additional 15 days.

In July 1977, the company appealed for an order staying administrative decision of the Hearing Board, and the county opposed the petition. The appellate court denied the petition on the grounds that the company did not exhaust the administrative procedures available to it, and that the decision of the Hearing Board in September 1977, would apply.

The resolution of the Hearing Board put the company on a compliance schedule, since the company claimed it was committed to the installation of odor abatement equipment. The Hearing Board also stated that there would be a continuation of the matter at the December 1977 meeting in order to allow the company time for fabrication, installation, and testing of the new equipment. An Authority to Construct was granted in September 1977, for 1-year's duration, but it was noted that the installation was expected to be completed by November 21, 1977. In February 1978, the equipment passed an odor panel test, and on April 19, 1978, the source passed a particulate loading test. The equipment had some reliability problems, hence the 60-day reliability test period was extended an additional 30 days in mid-1978. There were no major problems with performance after that time.

Emissions Profile

An emission profile has not been prepared for this case since principal complaints were directed to odor. In addition, there are only two points of reference for quantitative emissions of the source; an odor panel test in February 1978, and a particulate test in April 1978. This company has been included as an example of a recalcitrant operation and an illustration of the legal procedures open to the APCD and a company.

Conclusions

The fertilizer plant is a support operation for the principal product of the company: the raising of laying chickens and the sale of shell eggs. Although the process was installed in the early 1960s in cooperation with the County Health Department, odor complaints were first received in 1972, and again in 1975, due to encroaching suburban sprawl. The company stated, during the interview, that it did not recognize the APCD's jurisdiction and that odor abatement efforts stemmed from being a good neighbor. Since the company made no apparent efforts to follow a compliance schedule granted in late 1976, and had to apply for another Authority to Construct in May 1977, it is obvious that the company was recalcitrant in its odor abatement efforts. A portion of this can be explained by the apparent lack of technical expertise applied to the problem, as evidenced by the multiple attempts by differing strategies for reducing the odor emissions.

FOOD AND DRUG-RELATED INDUSTRY
Source No. 3

Facility Description

The company is involved in the canning of seafood products. Construction of the plant started in March 1974, and was completed in June 1976. The facility is located on 17 acres of land in an industrial area, and is bordered on one side by a waterfront. The company operates 16 hrs/day, 5 or 6 days/week on a year-round basis.

Key Operations and Pollution Control Equipment

Plant operations can be divided into three categories: the process steam boilers; the butchering, precooking, cleaning, and canning operations; and the fish meal plant. The Cleaver Brooks boilers are uncontrolled since their primary fuel is natural gas, and their standby fuel is No. 2 fuel oil. An American Air Filter Model 10-48-660 baghouse is used to collect dust emissions from the fish meal dryer and storage tank. A Ceilcote three-stage scrubber controls odors from the butchering area, and a portion of the odors from the storage tanks and digesters. A Duall Industries Model F-101-D3 Odor Control Scrubber removes odors from the cooking and cleaning area, and a portion of the odors from the storage tanks and digesters. The plant utilizes a recycled air circulation system with approximately 10 percent being ducted to the control equipment.

Decision Making

In 1973 and 1974, the company was in contact with the APCD regarding pollution control requirements for the reduction of odors from their proposed plant. The company proposed the installation of odor control scrubbers and submitted extensive data on the effectiveness of the technique. The official position of the APCD at that time was that incineration was the only proven and hence acceptable technique of odor control. Since the company had already committed itself to the building of the plant, the facility was redesigned to minimize the size of the incinerators needed. The approach was to create a sealed environment and to completely air condition the plant. Because the amount of air processed by the incinerators was directly related to the installation and operating costs of the control equipment, 10 percent of the air flow is incinerated and vented to the atmosphere while the remaining 90 percent is recirculated. The facility layout was designed around the pollution control system.

During August 1976, the APCD advised the company that odor reduction by chemical scrubbers had been proven to be an effective control technique, and the company could convert to that control technology if it so desired. Since the installation of the equipment had been completed, the company chose to continue the use of the incinerators for abatement.

In early 1977, the company installed a Duall two-stage chemical scrubber to help control odors from the soluble oil systems since the incinerator alone was inadequate.

In early April 1978, the company applied for and received an Authority to Construct for replacement of the incineration system with chemical scrubbers. The reason prompting the action was excessive fuel costs incurred by the incineration operations. Decisions are made at the Division Vice-President level.

Financial Impact

The cost of redesigning the plant and including an air conditioning system compatible with the incinerators was approximately $1,500,000. The cost of the incinerators was $280,000. Maintenance was minimal, but fuel costs were approximately $187,000 per year. The capital worth of the controlled equipment was $1,970,000. The new scrubbing systems cost a total of $75,000 and the projected cost of operation was expected to be approximately $10,000 per year.

Performance and Problems

The fume incinerators performed satisfactorily after initial shakedown operations, and there are no records of odor complaints. The incinerator controlling fumes from the soluble oils system was determined to be inadequate and a Duall two-stage scrubber was installed in early 1977. The scrubber was placed in series, and vented to the existing incinerator. The performance of the Duall three-stage scrubber installed in 1978 has been satisfactory and passed an odor panel test.

Chronology of Permits and Exceedances

The company applied for and was granted Authorities to Construct the facility in late 1974. The plant was in operation during June 1976, and the Authority to Construct expired on January 1, 1977. The company applied for and was granted an Authority to Construct the Duall scrubber that was installed in series with the incinerator on the soluble oils process. In March 1977, the company advised the APCD that the plant was not yet operating at full capacity, hence they could not yet request a Permit to Operate and requested an extension of the Authority to Construct to September 1, 1977. The extension was granted on April 4, 1977, and the APCD urged the company to proceed with source testing of the two Cleaver Brooks boilers. The Permits to Operate the boilers were issued on July 28, 1977.

On April 25, 1978, the APCD granted an Authority to Construct the Duall Industries Model F-101-D3 odor scrubber with associated modifications to the ducting, which replaced the fume incinerators. The Authority to Construct will expire on May 1, 1979. There are no records of exceedances.

Emissions Profile

An emissions profile has not been prepared for this company since emissions are odors, and the company is subject to nuisance regulations. Interactions between the company and the APCD on the control technique to be employed were of a preventative nature. There have been no complaints of odor emissions from the facility and it has been considered in compliance. This case has been presented as an illustration of the procedures followed when a new facility is constructed within the APCD's jurisdiction.

Conclusions

The control equipment proposed by the company was unacceptable at the time of the application, and an alternate technique was employed. The cost of redesigning the plant around the control equipment was of considerable financial impact and, although effective, the company felt operating costs were excessive. In 1976, the control technique originally proposed by the company was proven to be effective, and was declared acceptable to the APCD. Since the installation of the fume incinerators had been completed, the company chose not to modify the control technology. Due to excessive operating costs of the incinerators, the company replaced them with chemical scrubbers in 1978.

The company's original proposal for odor control utilized a state-of-the-art control technique which had not yet been proven effective. Although the company supplied considerable data showing the expected effectiveness of the system, the performance could not be guaranteed, whereas control by incineration was known to be effective. The company's production schedules dictated that the plant should be operational by June 1976, and time constraints imposed by construction requirements limited the time available to discuss the control technique which was subsequently declared effective in the reduction of odors.

FOOD AND DRUG RELATED INDUSTRY

Source No. 4

Facility Description

The company is involved in the canning of seafood products. The facility is located on approximately 12 acres of land in an industrial area, and is bordered on one side by a waterfront. The company operates 17 hrs/day, 5 days/week on a year-round basis, and has been at this location since 1971.

Key Operations and Pollution Control Equipment

The plant operations can be divided into four categories; the process steam boilers, the fish scrap reduction area, the butchering and precooking operations, and the packing and canning operation. There are two Union Iron Works 510 horsepower boilers, one Babcock and Wilcox 240 horsepower boiler, and Puget Sound Machinery Depot 300 horsepower boiler. Since all of these boilers are primarily fired with natural gas and are equipped to burn No. 2 fuel oil in case of gas curtailments, there is no pollution control equipment needed.

Ten percent of the odors from the packing room is vented to the fish scrap reduction area of the plant. Approximately 60 percent of the odors from the reduction area are vented to a first stage Duall Model F-101 sulfuric acid scrubber after being injected with chlorine gas. The exhaust gases from this scrubber are vented to a second stage Duall Model F-101 caustic scrubber and are vented to the atmosphere. Another 10 percent of the odors from the packing room are vented to the precooking operations. The odor bearing atmosphere from this operation is combined with the remaining 40 percent of exhaust air from the reduction plant and is injected with chlorine gas before entering the second stage Duall Model F-101 caustic scrubber. The remaining 80 percent of the exhaust from the packing room is vented directly to a single stage Duall Model F-101 water scrubber after having been injected with chlorine gas.

Decision Making

In November 1973, further efforts were directed to controlling odors from process operations. The company decided to try minimum capital investment control equipment but the decision was reversed when the APCD refused approval. It was then decided to minimize cost impact by installing heat recovery equipment on the proposed incineration system. The decisions were made by the President of the subsidiary, but were never implemented because the parent company filed Chapter X bankruptcy in November 1974.

The facility was purchased by another company in April 1975, and the new management felt incineration was not as cost effective as scrubber technology. After discussion with the APCD, a pilot program was proposed to demonstrate the effectiveness of the scrubbers. The pilot program was successful and the company implemented the installation of the full scale operation. Decisions of the new management were made at the Presidential level of the subsidiary.

Financial Impact

Since the originally proposed incineration system was never implemented, financial records are limited to the cost and operation of the scrubbing system. The installation of the scrubbers cost $75,000 and the cost for the equipment was $110,000. Utility bills for the equipment are approximately $90,000 per year which represent 8 percent of the total used by the facility. Additional operating and maintenance costs are approximately $35,000 per year.

Performance and Problems

Due to concerns for odor emissions by the APCD, the company attempted to use minimum control technology to condense odor bearing steam with water sprays. This approach was unsatisfactory to the APCD and a proposal was submitted to install fume incineration equipment equipped with waste heat boilers to minimize operating cost impacts. The program was never implemented due to cash flow problems within the parent company which subsequently filed bankruptcy in November 1974.

Under new ownership in April 1975, the company felt odor control by incineration was economically unattractive, and proposed chemical scrubbing technology to the APCD. After pilot tests had been run and the technology proven effective, construction of the control equipment was implemented in October 1976. The system was operational and Permits to Operate were issued in September 1977.

Chronology of Permits and Exceedances

Permits to Operate were initially granted in 1971. In November 1973, due to odor concerns, an Authority to Construct was applied for and denied on the basis that the proposed method of control was inadequate. The company filed a petition to review the denial or, in the alternative, request a variance in December 1973. The company submitted a compliance schedule in February 1974 which was found acceptable by the APCD. In March 1974 the company submitted a letter to the Hearing Board requesting withdrawal of the petition. An Authority to Construct was granted by the APCD in June 1974, and was amended to reflect changes in the control equipment in September 1974. The company advised the APCD that it would be unable to meet the dates set forth in the compliance schedule due to financial hardship incurred by the filing of bankruptcy by the parent company.

In January 1975, the company applied for a variance. Proceedings of the Hearing Board were carried forward to November 1975 when the variance was granted until May 31, 1976, conditional on the running of a pilot program to demonstrate the effectiveness of chemical scrubbing technology, and installation of full scale control equipment by March 1976. The pilot test program ran into difficulties and was delayed, hence the company applied to the Hearing Board for an extension to the Variance and submitted a modified compliance schedule in March 1976. The Hearing Board met in November 1976, and granted the extension until February 1977.

Delivery problems with the control equipment delayed the completion of the installation, and an additional extension of one month was allowed by the APCD in March 1977. The system commenced shakedown operations and performance and reliability testing shortly thereafter, with Permits to Operate being granted in September 1977. There were no records of Notices of Violations filed for exceedances. It must be noted that after the control equipment became operational and odors from this process were eliminated, it was discovered that another process at the facility was generating odors and additional control equipment was installed.

Emissions Profile

Because the pollutant emission is odor, it is not possible to quantify emissions, hence an emissions profile was not prepared. The source passed an odor panel test in September 1977, but there have been subsequent complaints. This source has been included to illustrate the APCD's interactions with a company subject to compounded circumstances.

Conclusions

The original proposal to control odor bearing steam by condensation from water sprays was declared unacceptable by the APCD. Control by incineration was proposed but never implemented due to finance problems instigated by the parent company's declaration of bankruptcy. Because of the excessive operating costs associated with incineration, the company, under new management, proposed a demonstration of the effectiveness of odor reduction by chemical scrubbing techniques with a pilot plant. This program resulted in the acceptance by the APCD of an alternate state-of-the-art method of control equivalent to incineration.

The case illustrates the persistence of the APCD to reduce pollutants (odor) from a company subject to circumstances beyond its control and exemplifies the cooperation possible between the agency and industry.

APPENDIX A

SOURCE LETTER

CERTIFIED MAIL NO.
RETURN RECEIPT REQUESTED

Dear

Pacific Environmental Services, Inc., has been selected by the President's Council on Environmental Quality to study the cost and effectiveness of the air quality regulatory process in San Diego County. This study constitutes part of a nationwide re-evaluation of approaches that have been embodied in the Clean Air Act Amendments of 1970 and 1977. The outcome of this study will be to recommend changes in national legislation.

As part of this effort, we are studying the following in San Diego County:

- The responses of industry to the San Diego Air Pollution Control District's regulatory programs; and
- The nature of the San Diego APCD's programs.

At this juncture in our study, we are visiting approximately 30 industries in San Diego County to discuss their responses to San Diego APCD programs and to obtain suggestions from industry with regard to changes in this regulatory process. In addition, we are interested in your cost and operation experience in meeting government regulatory requirements.

Because this information will be used only for research purposes, the facilities we visit will remain anonymous to the sponsor of this project and the data which we obtain will be handled confidentially.

Pacific Environmental Services, INC. 1930 14th Street Santa Monica, California 90404 Telephone (213) 450-1800

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With this in mind, we would appreciate your suggesting a convenient date and time for a meeting at to discuss your experience in operating under the San Diego APCD air quality rules and regulations, and to have an informal tour of your facility. If you have any questions or wish additional information concerning this research effort, please feel free to contact me at (213) 450-1800.

We look forward to an opportunity to meet with you and further discuss this effort in the immediate days ahead.

Sincerely yours,

Robert J. Bryan
Vice President
Pacific Environmental Services, Inc.

RJB:lcy